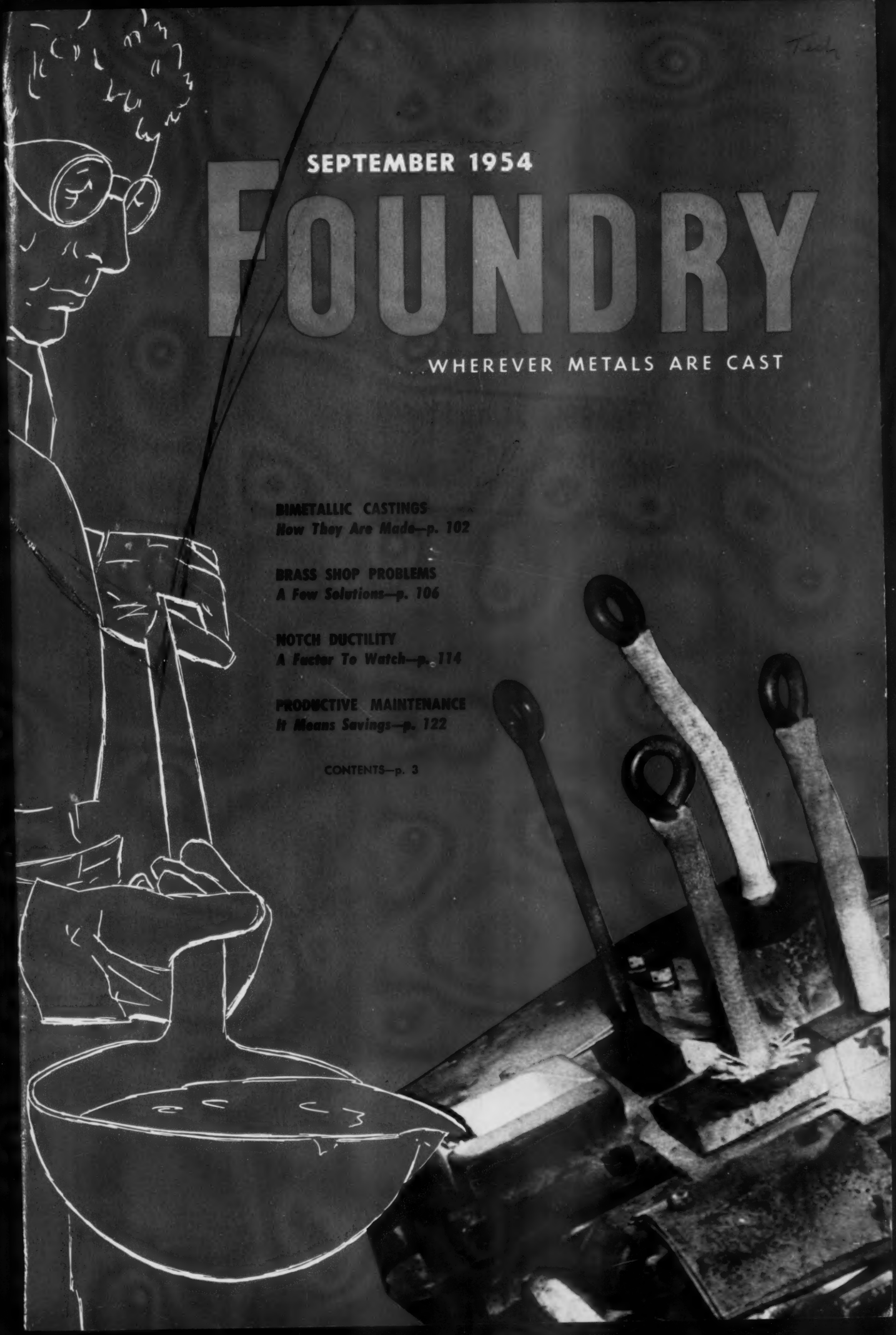
SEPTEMBER 1954

FOUNDRY

WHEREVER METALS ARE CAST



BIMETALLIC CASTINGS
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A Few Solutions—p. 106

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A Factor To Watch—p. 114

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It Means Savings—p. 122

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R v.82 pt.3 S-D'54

The man who uses your castings can MACHINE UP TO 35% MORE CASTINGS PER TOOL

Iron deoxidized with FERROCARBO® patented Briquettes is *premium* iron... free from segregations, inclusions, and deep hard chilled spots. It is more easily machined, adds up to 35% to the life of cutting tools...often permits increases in machining speeds. In addition, the castings you supply are finer-grained, denser, stronger than castings made from untreated iron.

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Manufacturers of a Broad Line of Foundry Equipment

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There's a new Federal bulletin on the preparation of molding sand, that hundreds of foundrymen have found extremely helpful. A copy is yours for the asking. Write for it today!

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If you use the slurry system of sand bonding, you'll want to learn about Federal's #1200 Slurry Grade, Granulated Green Bond Bentonite . . . and how it's used with Crown Hill Seacoal and Federal Sand Stabilizer to make the perfect slurry. We'll gladly consult with you or send complete information.

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FOUNDRY

September 1954

Volume 82—Number 9

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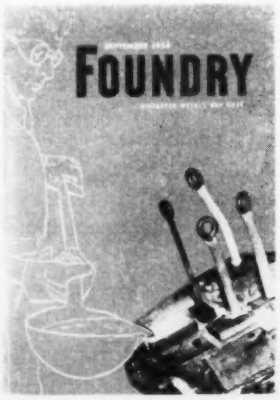

THE COVER: Pouring metal into permanent mold as part of bimetallic casting process at Wellworthy Ltd., near Lymington, Eng. See story, page 102

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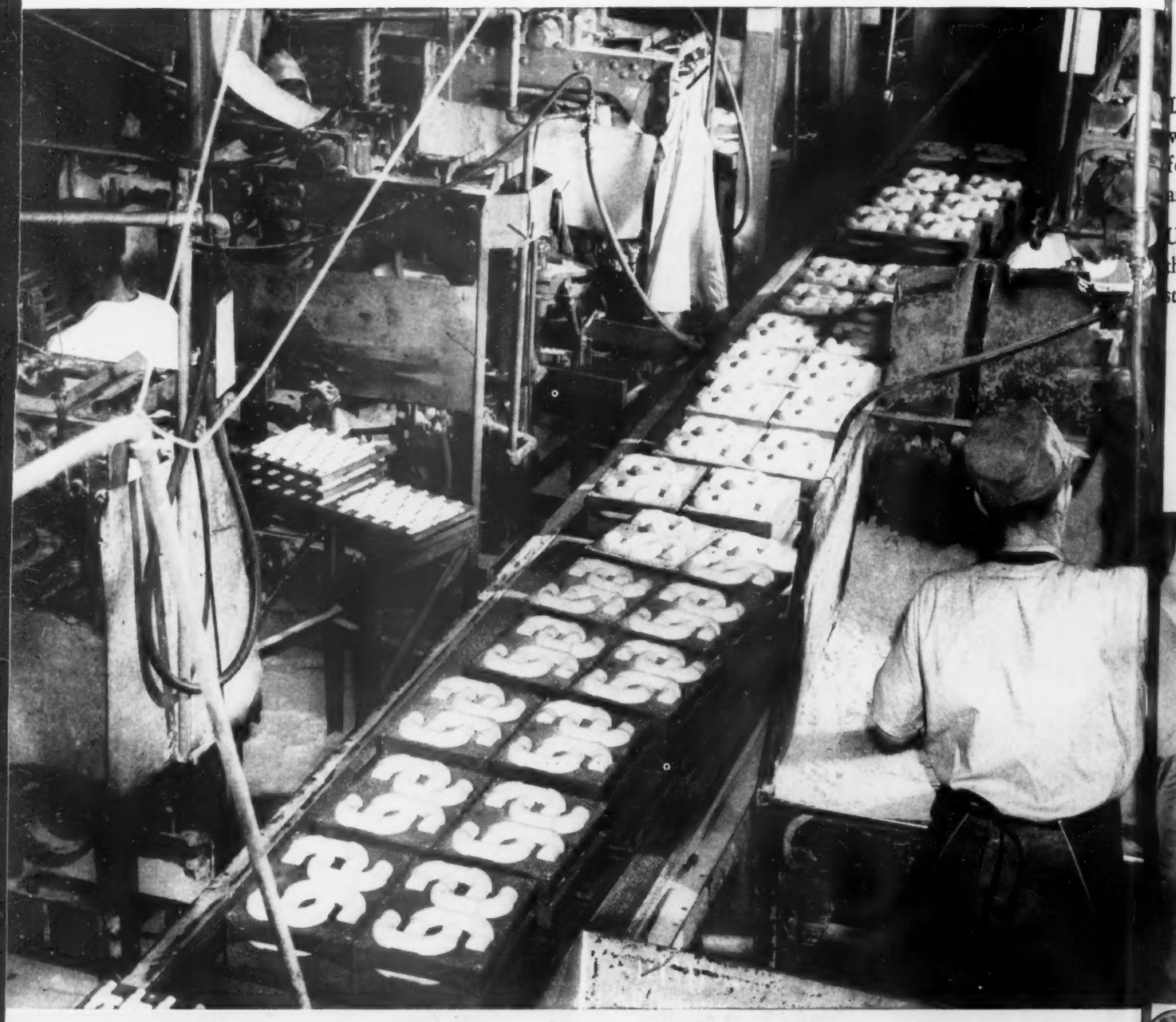
In *UNION Cores there is strength.



Central conveyor belt, straddled by high speed blowers on one side and hand ramming benches on the other, feeds cores to continuous tower oven. 85% of the cores are blown.

THE UNION MALLEABLE MANUFACTURING CO., *Ashland, Ohio

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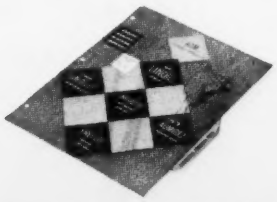

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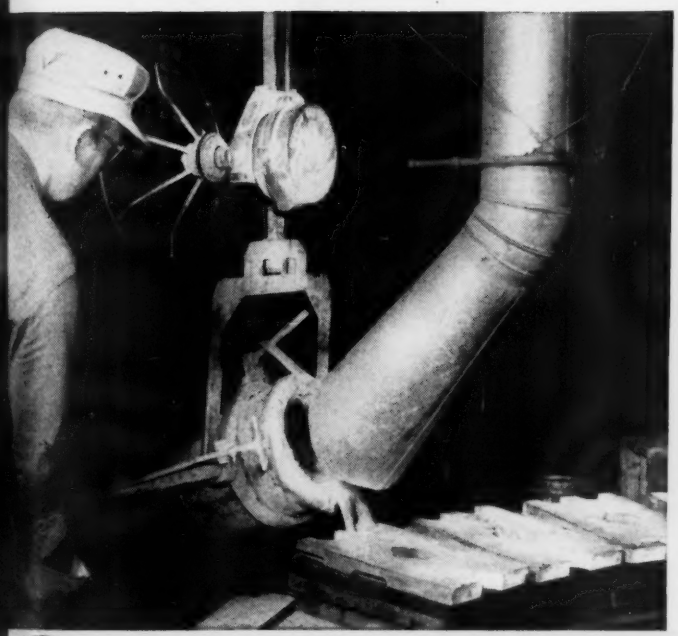
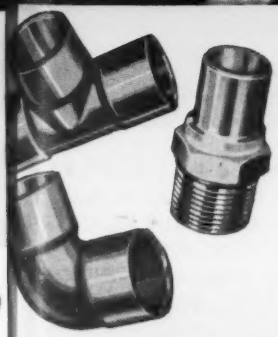
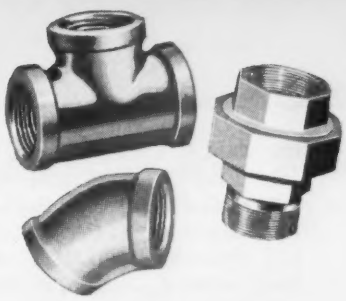


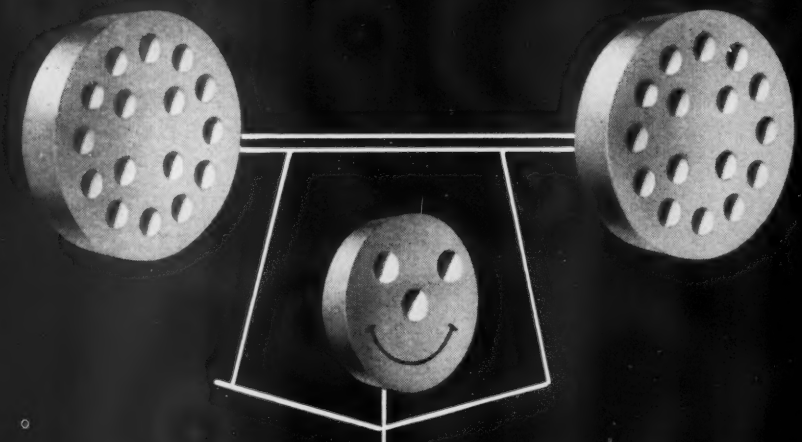


20% of the company's cores are supplied to Union's subsidiary foundry, Union Copper & Brass Company. Operator is pouring brass fittings on modern merry-go-round conveyor.



Setting cores in multiple mold prior to pouring malleable iron fittings. Strong LINOIL cores stand up well under transporting and handling.

YOU'RE ON THE RIGHT TRACK WITH THE ADM LINE OF QUALITY FOUNDRY PRODUCTS



This growing 6-year-old has been given a <u>new</u> name

Louthan

Co-developers (with Harbison-Walker) of

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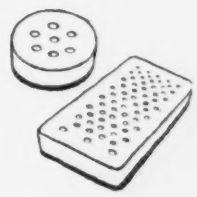
Facts you should know about

LOUTHAN REFRACTORY STRAINER CORES

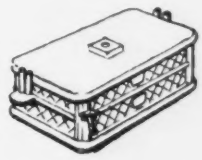
The product

Louthan perfected and made the *first* successful refractory strainer cores. While marketed up to now by Harbison-Walker, all have been *made by Louthan*, a former subsidiary of "H-W". All Louthan Cores are made of a high-strength ceramic material having a low thermal expansion. All are precision formed and kiln fired. All are *guaranteed* to withstand pouring temperatures up to 3,000° F. without spalling or eroding—a great help in producing better, cleaner castings at lower costs.



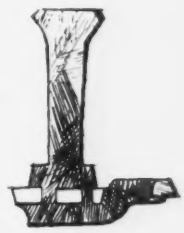
Its uses and advantages

Used by leading foundries in the making of *nearly ten million* castings last year, Louthan Refractory Strainer Cores pay for themselves many times over. Easily inserted in the drag, they closely control the flow of metal, keep slag and sand-core inclusions out of castings, save needless grinding and rejects, permit users to work to closer tolerances, often eliminate the need of costly gating systems.



Performance standards; sizes and shapes

High in thermal shock resistance (*will withstand immersion in 3,000 degree molten steel for 25 seconds without spalling or disintegrating*). Louthan Cores are exceptionally uniform, dimensionally accurate, no flash in openings, easy to handle and use. Available in seven standard sizes (ranging from 1¾″ to 3½″ in diameter), also in special sizes and shapes to meet your specific requirements.

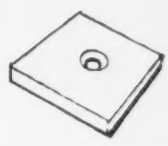


Sales representation

Louthan Strainer Cores will be distributed and sold by leading *foundry supply houses* exclusively. Their knowledge of your business should be helpful in your making the best use of these refractory strainer cores. These jobbers will also carry stocks for your added convenience.

Louthan Refractory Breaker Cores

A joint development of Louthan, H-W and the Steel Founders Society, these breaker core shapes are saving time and money for a growing number of steel casting producers. Scientifically designed for just the right amount of heat conductivity needed for perfect castings. Available in a wide range of sizes.



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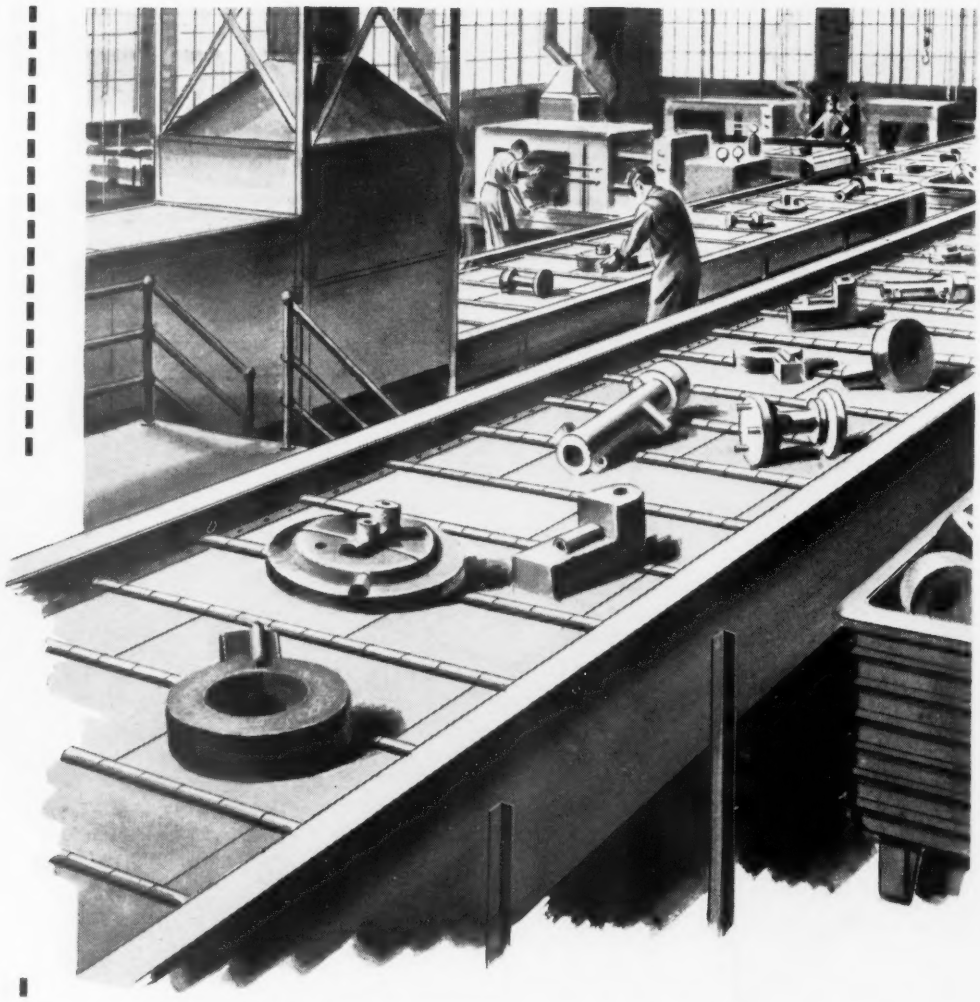
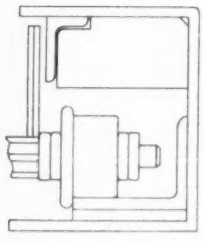
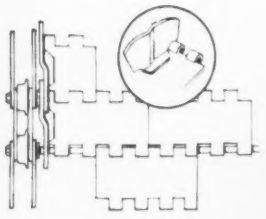


May-Fran hinged-steel conveyor belt . . . out performs them all in the foundry



Drawing shows construction details of "skirt" which prevents entry of foreign matter and protects side chains.



Outside links incorporate interlocking wings . . . remain positively engaged at all times.

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Heavy gauge hinged-steel links are connected in horizontal rows by means of high-carbon steel rods. Side chains become an integral part of the locking wings which remain positively engaged at all times. Link and rod construction eliminates fall-through.

Widths furnished from 6-inches to 6-feet can meet your specifications for a steel conveyor belt of any length or carrying capacity. Either solid or perforated links are available in 2½, 4, 6, 9 and 12-inch pitch lengths. For conveyor belting that out performs, out lives them all . . . specify May-Fran Hinged-Steel Conveyor Belting.

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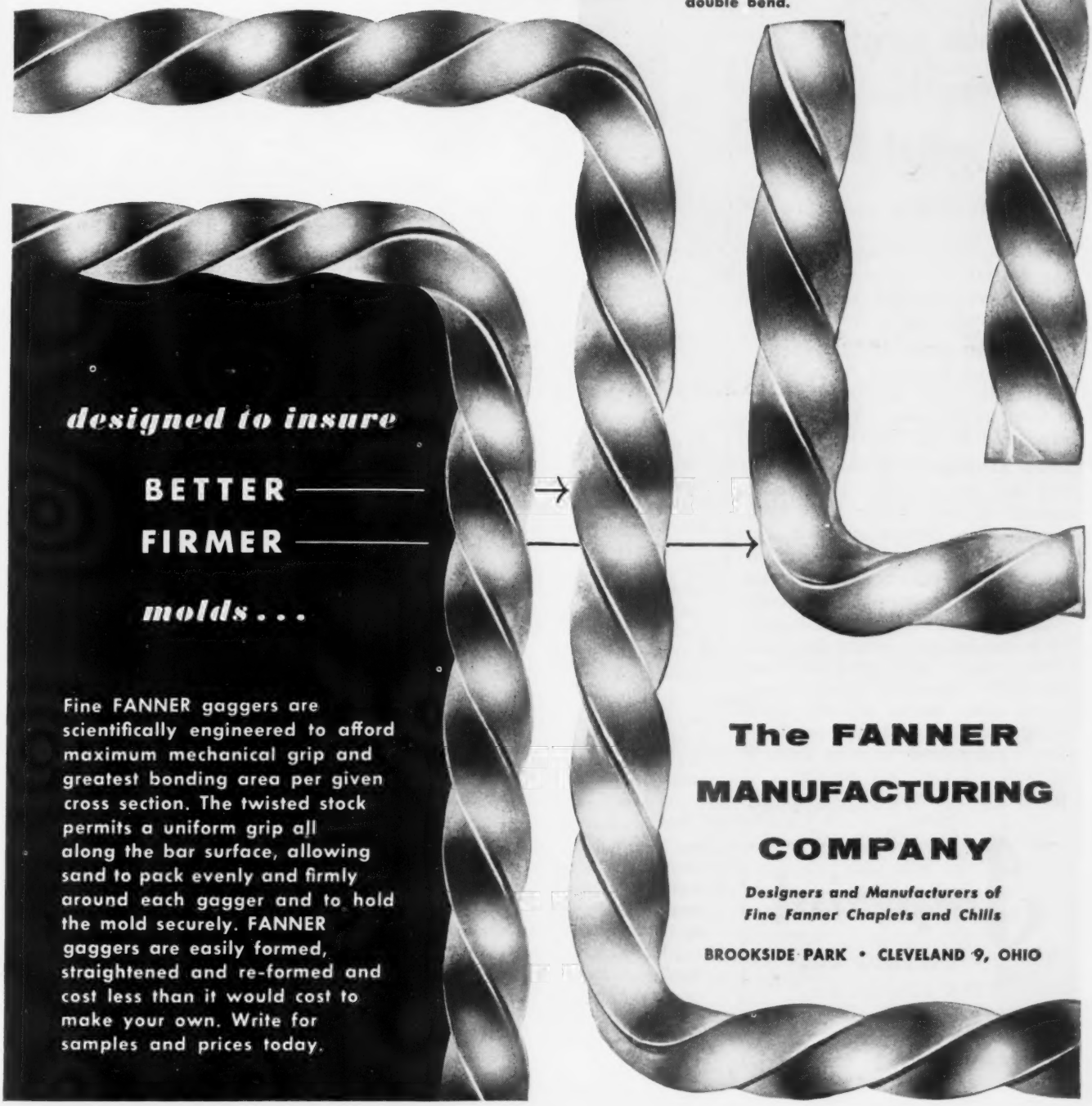

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WITH THE EDITORS

TROUBLE SHOOTING: A practical discussion of a normal production problem was presented last month on page 176 under the general heading "Trouble Shooting." This is the first of a series; the second discussion appears on page 202 of this issue.

In the August issue the author first posed a question concerning trouble with gas porosity in aluminum castings and then proceeded to give the reasons for the difficulty and a way to solve it. The question in this issue concerns use of synthetic sand in the nonferrous foundry. The same style of presentation will be included in future practical discussions under the "Trouble Shooting" heading.

C. W. AMMEN

Charlie Ammen, the author, says he is just a plain foundryman—nothing fancy. His foundry career started quite by accident, as perhaps do the careers of many in the industry. After his second year in high school, he went to sea as a marine radio operator. He shipped with a sea-going molder. Charlie says the gink talked, ate and slept foundry while at sea, and pretty soon Charlie and the sea-going molder were visiting foundries from the pole to the horn.

The thing got in his blood. Charlie says he became so interested in the foundry that he decided to make it his life's work. So from a brass pounder (a marine radio operator) he became a brass foundry molder.

He served an apprenticeship as a molder, hobo fashion. He studied electrical engineering and industrial metallurgy with International Correspondence Schools. Over the years he has worked as molder, coremaker, melter, boss, superintendent and works manager. Once he struck out on his own, but he says he went broke on the venture.

During World War II he specialized in nonferrous work for the U.S.A.F. He later spent some time with the Chrysler Corp. as foundry process control engineer on the V-12 Continental engine at the Michoud Ordnance Plant, New Orleans. At present he is foundry superintendent, California Brass Mfg. Co., Los Angeles. He is active in foundry groups and conferences at which occasionally, he admits, he gives some "awfully long-winded talks" on basic foundry practice.

—o—

Exchange of Ideas: Erwin D. Canham, editor, *Christian Science Monitor,* has emphasized a previously suggested idea that organized groups can play an important part in bringing a better understanding among the peoples of the world. Speaking recently on "Chances for Peace" before the alumni banquet at Case Institute of Technology, Cleveland, Mr. Canham stated:

"I would propose that every voluntary private organization in the United States should ask itself: What can this organization do to spread and demonstrate the concept of the free system in the world? There are thousands of individual posts of veterans' organizations in the United States; thousands of trade and professional organizations; thousands of women's clubs; thousands of civic groups; thousands of labor unions; thousands of organized farmers; of fraternal organizations; of church groups.

"If each individual branch of these infinitely varied and representative organizations would set in motion some single program of international communication in the interest of freedom—however modest—it would add up to a critical mass of incalculable potency. Nearly all of these individual units could finance—for example—a modest exchange-of-persons program by which qualified Americans could go briefly to some part of the world where their experience and know-how might be most useful, and interested citizens of other lands could come to the United States to inform themselves of the practical working of that part of the free system which interested them most. There are countless other ways in which the same kind of communication could be opened up.

"The important point is that this communication must be two-way. We will learn as well as teach, and it is conceivable that what we learn will be as important to us as what we teach will be to others."

The foundry industry has been interested in the field of international relations for many years. Since the

(*Concluded on page* 12)

CONTROL !

ONLY CRUCIBLE MELTING GIVES THE CLOSE CONTROL OF FURNACE ATMOSPHERE SO ESSENTIAL TO MEET MODERN METALLURGICAL REQUIREMENTS.

CRUCIBLE MELTING

Universal Castings Corp., Chicago, Illinois
8 Crucible furnaces, No. 70 Crucibles, oil fuel.

Desirable melting requirements can be met best with Crucible furnaces; for example, Crucible furnaces, operated with a slightly oxidizing atmosphere, produce the results indicated in the fourth A.F.S. Foundation Lecture—"the best melt qualities were obtained by exposing the melt to oxidation."

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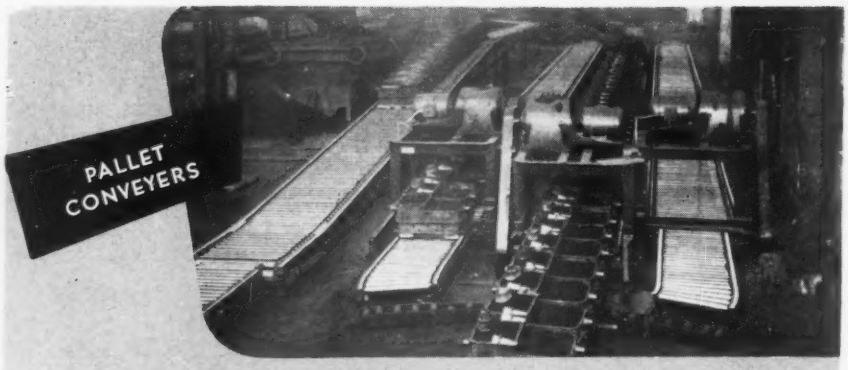
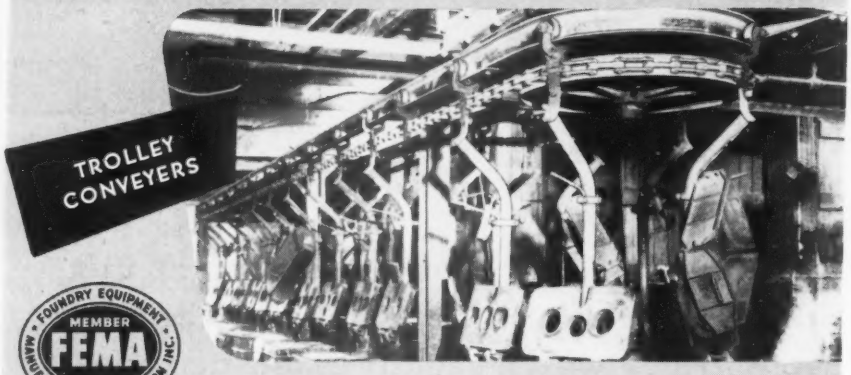
ROSS-TACONY CRUCIBLE CO.

Have you seen the new "'CRUCIBLE CHARLIE' says . ." leaflets issued by Crucible Manufacturers Association? If not, ask your superintendent about this. He has a copy.





FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION INC. MEMBER FEMA

Mathews builds them all for foundry service

● One pound, or ten tons . . . whatever the loads weigh, there are Mathews Conveyers to handle them efficiently. Foundry conveyer installations require engineering and planning by people who know modern foundry conveying methods. Mathews engineers have been working with foundrymen for nearly 50 years. Call your nearest Mathews representative when you are looking for the best in foundry conveyers.

MC **MATHEWS CONVEYERS**

GENERAL OFFICES . . . . . *Mathews Conveyer Company*
ELLWOOD CITY, PENNSYLVANIA

PACIFIC COAST DIVISION . . *Mathews Conveyer Company West Coast*
SAN CARLOS, CALIFORNIA

CANADIAN DIVISION . . . . . *Mathews Conveyer Company, Ltd.*
PORT HOPE, ONTARIO

Engineering Offices or Sales Agencies in Principal American and Canadian Cities

(*Concluded from page* 10)

end of World War I, the American Foundrymen's Society has been a member of an international foundrymen's committee whose purpose is the exchange of information on foundry practice. Representatives of member organizations have presented exchange papers on a wide variety of foundry subjects at many AFS conventions, and members of the society have supplied exchange papers for a large number of foundry meetings in various countries. Delegations of foundrymen from the United States have attended many of the international foundry conferences held abroad, and the four international congresses held in this country have had visiting delegations.

The trade associations likewise have maintained contact with representatives of the foundry industry in numerous countries. Since World War II, productivity teams from Great Britain and the Continent have visited foundries in this country and have been assisted in the studies by the foundry organizations of this country. Representatives of American trade associations in the foundry industry have visited abroad. Several of the trade groups maintain contact with the comparable groups in other countries.

The foundry industry can be proud of its record in the mutual exchange of information. In the light of Mr. Canham's remarks, perhaps the program might be expanded.

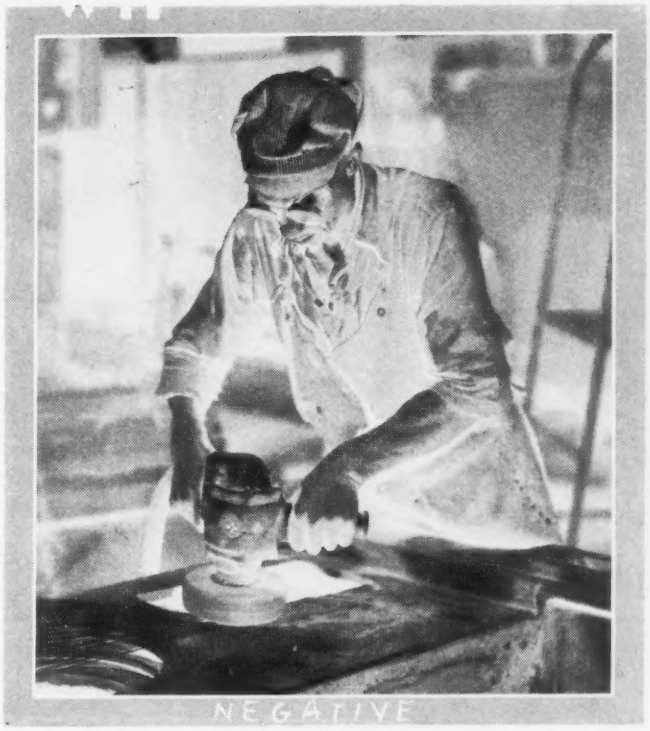
—o—

Who Will Stand? The next time your favorite group gets into a squabble over some inconsequential change in bylaws, you might introduce the following amendment: Standing committees shall remain seated although they shall stand for the principle of seating the new members of the standing committees, notwithstanding that the plans of most committees are well seated due to previous understandings.

—o—

Vacation: Once again this department has been written while on vacation at a small lake resort in northeastern Indiana. Pleasant days, cool nights, beautiful scenery and real relaxation take the mind away from the hurly-burly of national and international affairs. Even the problems created by the easing of demand for castings seem far away as I try a bit of fishing. But before this issue reaches you, the 1954 vacation for most of the editors will be just memories, and all of us will be starting on the fall circuit that will take us to many meetings and into a sizable number of foundries. Hope we will be seeing you on our travels.

F.G.S.



OUTSTANDING SNAGGING ECONOMY

with Cincinnati (PD) Snagging Wheels

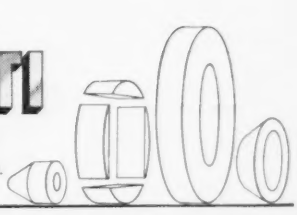
Whether you use stand, swing frame or portable grinders, you can do a better job using CINCINNATI (PD) SNAGGING WHEELS. You get not only outstanding economy, freer cutting and self-dressing action in CINCINNATI (PD) WHEELS . . . *but Positive Duplication.*

Just as a negative guarantees exact duplication of a photograph, the CINCINNATI (PD) *Manufacturing Process assures a Positive Duplication of the original wheel every time you reorder. Yet these better, cost-cutting* CINCINNATI (PD) WHEELS *are priced no higher than ordinary wheels.*

Positive Duplication (PD) is the result of extensive manufacturing research and the development of new standards of manufacture with 36 quality control steps. "On grade" with a CINCINNATI (PD) WHEEL means all future (PD) WHEELS will act and grind exactly alike–providing the *same fast cutting* of the original wheel, the *same long wheel life,* the *same reduced operator fatigue* and the *same self-dressing action.*

CINCINNATI (PD) WHEELS are made in vitrified and resinoid bonds for ferrous and non-ferrous foundries and weld shops. They are available in a complete variety of popular sizes and shapes. We'll be happy to tell you about our complete line of straight wheels, cups, cones and plugs, and to prove to you how CINCINNATI (PD) WHEELS will make money for you. Just contact us and we'll send one of our representatives. Wire, write or 'phone Sales Manager, Cincinnati Milling Products Division, The Cincinnati Milling Machine Co., Cincinnati 9, Ohio.

CINCINNATI
Grinding Wheels
THE CINCINNATI MILLING MACHINE CO.
Cincinnati 9, Ohio



1854 *100 Years* 1954

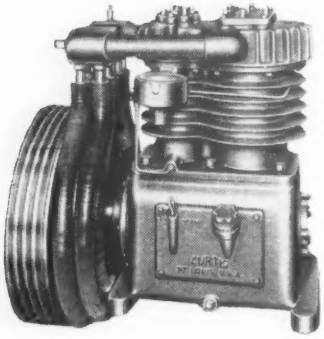
OF SUCCESSFUL MANUFACTURING EXPERIENCE

GET MORE PRODUCTION...PER MAN-HOUR

with the help of dependable, efficient

Curtis

AIR COMPRESSORS • AIR CYLINDERS • AIR HOISTS



MORE AIR AT LESS COST...
with precision-built *Curtis* compressors

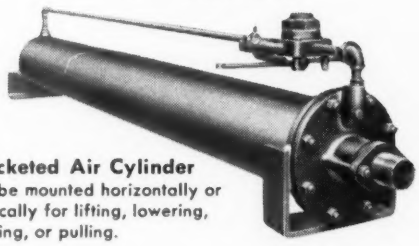
- available up to 50 H.P. (300 cu. ft.)
- improved—two-stage design delivers more air per horsepower
- air-cooled—no freeze up
- Timken tapered main bearings permit external adjustment
- pressure lubricated rod and piston bearings for long life

Tank mounted compressors
¼ through 15 horsepower (1½ to 80 cu. ft.)
Simple compressors
Base mounted compressors
¼ through 50 horsepower (1½ to 300 cu. ft.)

TO LIFT, LOWER, PUSH, OR PULL *Curtis* Air Cylinders or Air Hoists Will Do The Job Quickly, Easily, and Economically — capacities up to 10 tons.

- low-cost trouble-free operation
- smooth and delicate control
- cylinders, ground and polished
- self-closing, disc-type valves lapped to seat

Pendant Air Hoist... ideal for any lifting or lowering application.



Bracketed Air Cylinder can be mounted horizontally or vertically for lifting, lowering, pushing, or pulling.

FOR COMPLETE INFORMATION on how Curtis equipment can make your production more profitable, write today...

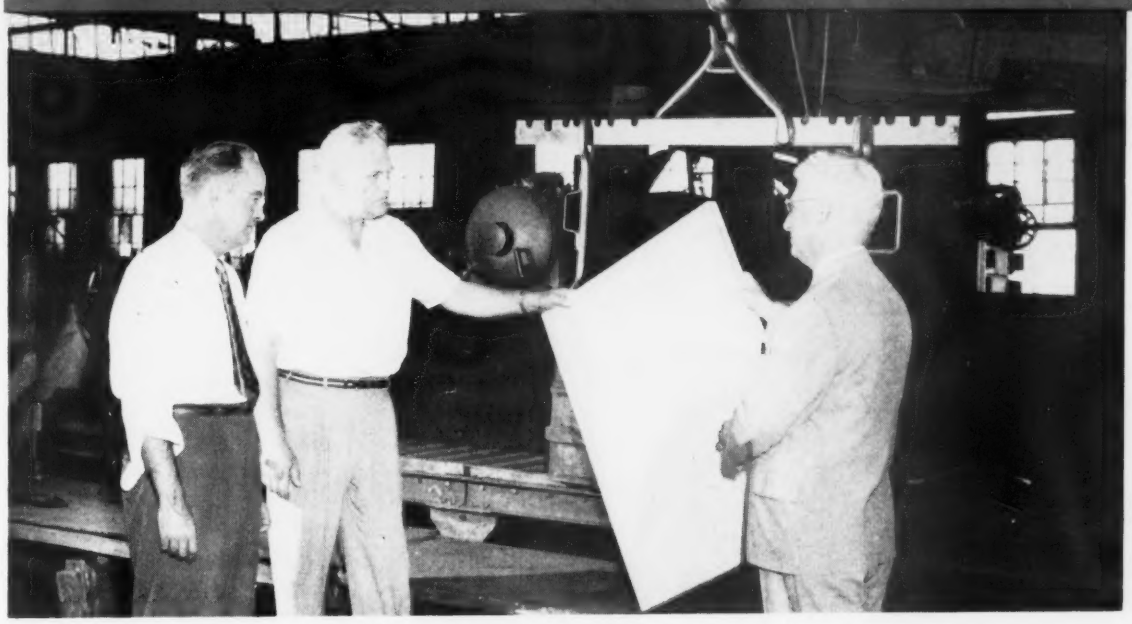
CURTIS PNEUMATIC MACHINERY DIVISION
of Curtis Manufacturing Company
1922 Kienlen Avenue, St. Louis 20, Missouri

CM-755-R

Bill Jones OF FEDERAL FOUNDRY SUPPLY CO.

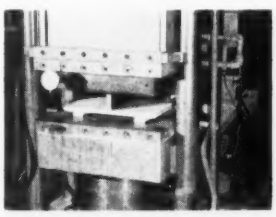
SHOWING the NEW RIMCO Foundry BOTTOM BOARD

to *Stan Olson* Foundry Superintendent of J. I. CASE, Rock Island, Illinois



Paul Snyder of RIMCO, Stan Olson, Bill Jones looking over the New Rimco Bottom Board

NO BURN OUTS
Rimco Bottom Boards are fire resistant up to 2900°.



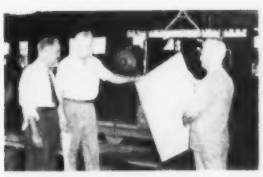
NO DEFLECTIONS
Rimco Bottom Boards subjected to over 5000 lbs. pressure.

USE BOTH SIDES
Rimco Bottom Boards give double value.

Looks Good - Feels Good - Is Good **The new RIMCO BOTTOM BOARD**

* *LOWERS YOUR COSTS*
* *INCREASES YOUR PRODUCTION*
* *DELIVERS BETTER CASTINGS*

Let us send you a Free sample of our Resinwood, the new miracle Bottom Board facing. Pour molten metal over this sample and see for yurself why Rimco Bottom Boards will last more than 10 times longer.



ON CONVEYORS
Giant Size Rimco Bottom Boards.

ON THE SQUEEZER
Your men will like them.

IN CORE DRYING OVEN
No warp — No deflection.

Let us send you further information, or ask any representative of or write to

THE FEDERAL FOUNDRY SUPPLY CO.

Cleveland • Crown Hill, W. Va. • Chicago • Detroit • Milwaukee
Richmond, Va. • St. Louis • Chattanooga • New York • Upton, Wyoming

QUALITY Since RIMCO 1868 MILLWORK

ROCK ISLAND MILLWORK COMPANY

RESINWOOD DIVISION

Rock Island **Illinois**

Grind off more metal per dollar – any metal!

Norton portable grinding wheels meet the widest range of cleaning room needs with the time-and-money-saving "TOUCH of GOLD"

Snagging Steel is faster, more profitable when a Norton ALUNDUM Resinoid wheel adds the "Touch of Gold".

One sure way to make your cleaning room more profitable is to use Norton wheels for your many portable grinding jobs.

In this most complete line you'll find abrasive-and-bond combinations that will give you fastest, coolest cutting action on every rough grinding operation, on every metal.

On high tensile strength metals, such as steels and steel alloys, Norton ALUNDUM* abrasive is the choice. On low tensile strength materials, such as gray iron and non-ferrous metals, Norton CRYSTOLON* abrasive gives best results. Norton bonds, vitrified and resinoid, cover all grinding speeds and are outstanding for efficient grain-holding qualities that improve cutting action and lengthen wheel life. In particular, the new Norton K Bond is the most radically improved vitrified bond ever developed for slow speed rough grinding of gray and malleable iron. In these applications, K Bond CRYSTOLON wheels are outlasting and outperforming all others.

They "Hug That Work"

Made with controlled uniformity and built-in balance — to degrees never before realized — Norton portable grinding wheels keep more continuous contact with the part being ground. They "*hug that work.*" Your operators can *feel* the difference, in less bounce and vibration. And you can *profit* by the difference in faster grinding, longer wheel life and less operator fatigue.

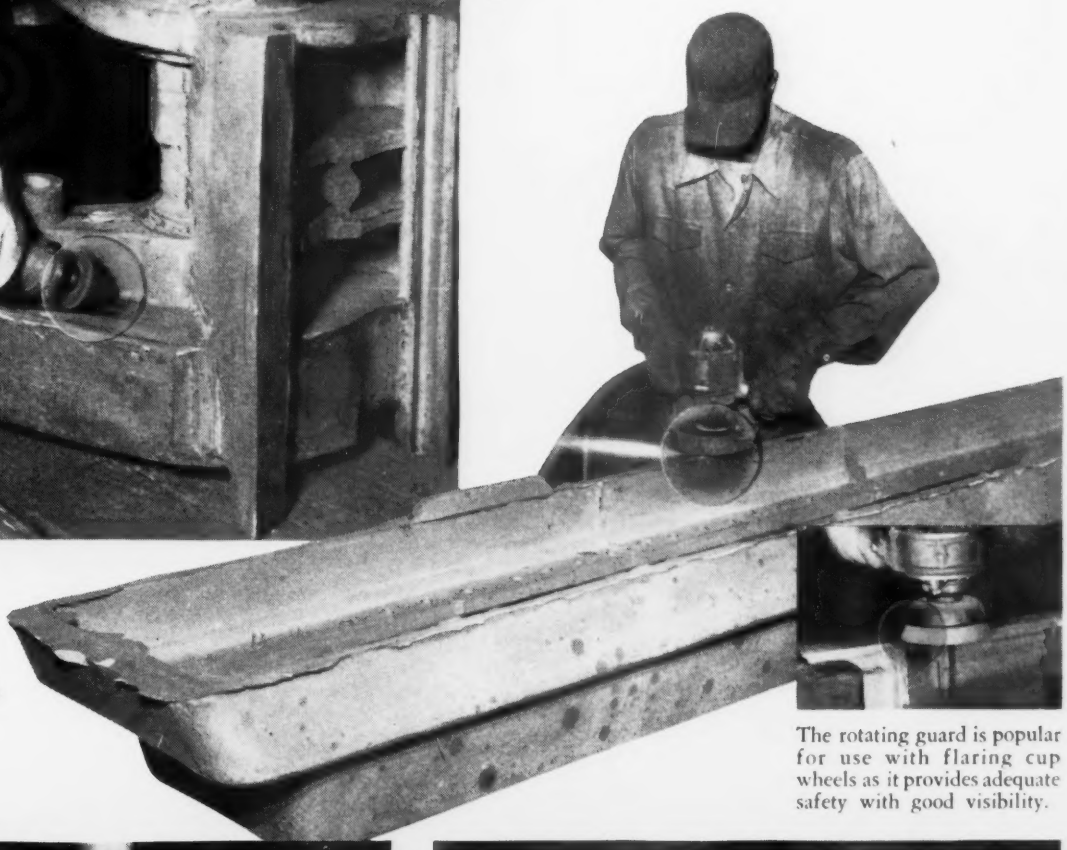
See your Norton Distributor

for practical aid in selecting Norton wheels that will add the profit-boosting "Touch of Gold" to your portable rough grinding operations. Or write to NORTON COMPANY, Worcester 6, Mass. Distributors in all principal cities, listed under "Grinding Wheels" in your classified phone directory. *Export:* Norton Behr-Manning Overseas Incorporated, Worcester 6, Mass.

Making better products . . . to make other products better

*Trade-Marks Reg. U. S. Pat. Off. and Foreign Countries

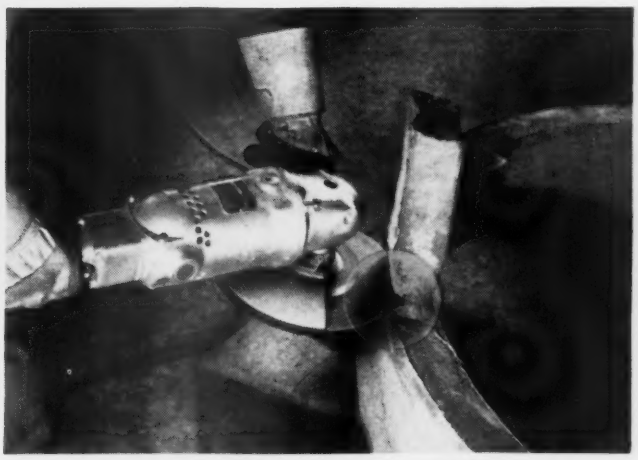
Gray Iron calls for the engineered cutting action of a Norton CRYSTOLON wheel, and the cone shape takes care of the corners in quick time. For slow peripheral speed applications on gray and unannealed malleable iron the new K Bond CRYSTOLON wheels have no equal.



A Large Meehanite Casting is another job for a Norton ALUNDUM Resinoid wheel. The cup shape wheel "hugs that work," reducing operator fatigue as it smooths the rough edges.

The rotating guard is popular for use with flaring cup wheels as it provides adequate safety with good visibility.

Fins On An Aluminum Part are removed with a Norton mounted point, made of sharp CRYSTOLON abrasive and trued on its own spindle. A special treatment minimizes loading.



For Notching Gates And Risers and for many light snagging and cleaning jobs Norton Nylon-Reinforced Hub Wheels — BD Rigid and BFR Semi-Flexible — are the fastest and safest made.

W-1588

NORTON

and its BEHR-MANNING division

NORTON: Abrasives • Grinding Wheels • Grinding Machines • Refractories
BEHR-MANNING: Coated Abrasives • Sharpening Stones • Pressure Sensitive Tapes

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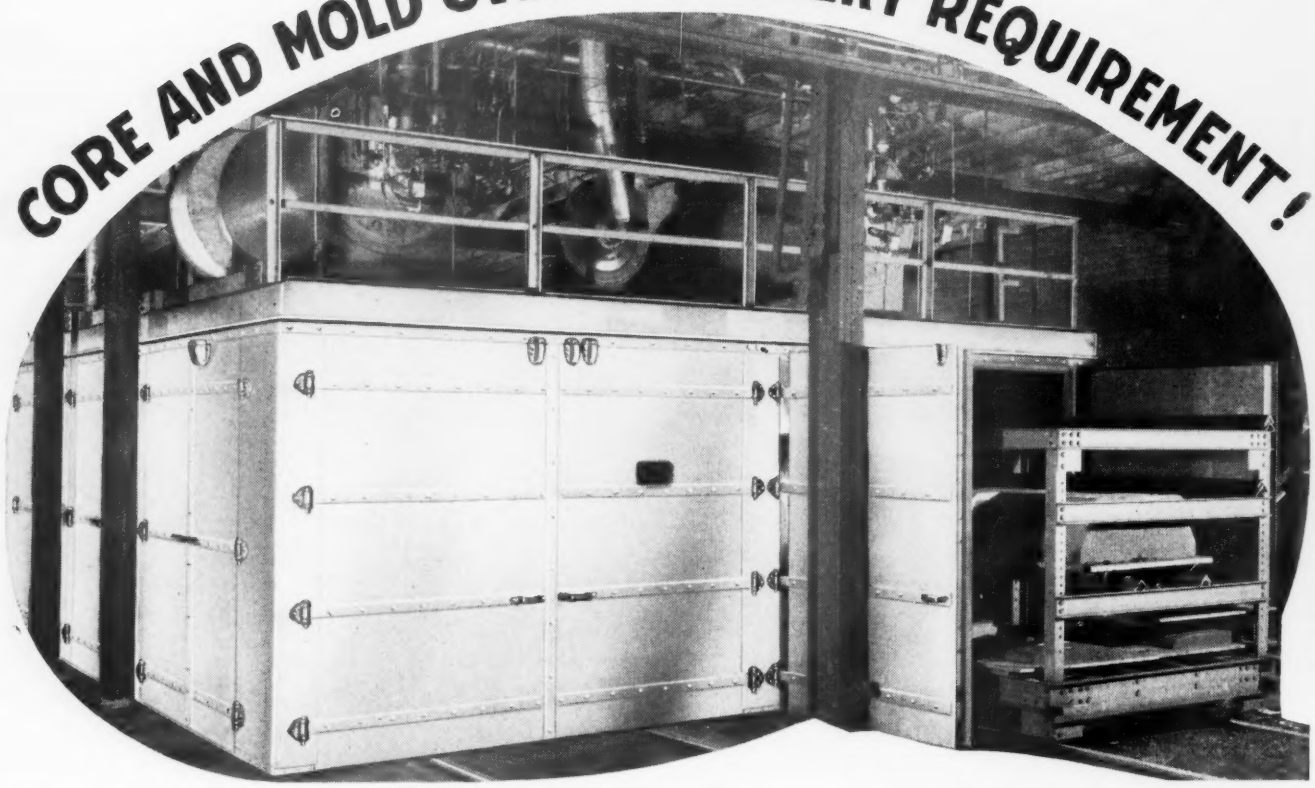
CARL-MAYER

Foundry Ovens are versatile!

CORE AND MOLD OVENS FOR EVERY REQUIREMENT!



Typical List of CM customers:

Aluminum Co. of America
American Brake Shoe Co.
American Radiator Co.
Blaw-Knox Co.
Brown Industries
Buick Motor Div. of General Motors Corp.
Bucyrus-Erie Co.
Cadillac Motor Div. of General Motors Corp.
Columbia Steel Corp. (U. S. Steel Corp.)
Crucible Steel Castings Co.
Dunkirk Radiator Co.
Eclipse Aviation Division of Bendix Aviation Corp.
Electric Autolite Co.
Ford Motor Co.
Fremont Foundry Co.
G. & C. Foundry Co.
General Electric Co.
General Motors Corp. and Subsidiaries
Gilbert & Barker Co.
General Steel Castings Co.
Golden Foundry Co., Inc.
Henry Kaiser Corp.
W. O. Larson Foundry Co.
Mesta Machine Co.
F. E. Meyers & Bro. Co.
Oil Well Supply Co. (U. S. Steel Corp.)
Packard Motor Car Co.
Pittsburgh Steel Foundry Corp.
H. B. Salter Co.
Shenango Penn Mold Co.
Standard Foundry Co.
Union Brass & Metal Mfg. Co.
Union Steel Castings Co.
West Michigan Steel Castings Co.
A. C. Williams Co.
Whiten Machine Works
Whiting Corp.

CARL - MAYER TWO-COMPARTMENT CAR TYPE OVEN FOR CORES AND MOLDS. Each oven, 12′ wide, 26′ deep, 9′ high. One oven is used for baking large cores at night and has doors on side, permitting its use as a rack type oven during the day. Other oven is for night baking. Both compartments are individually heated by a Carl-Mayer recirculating type gas-oil heater enabling use of either gas or oil.

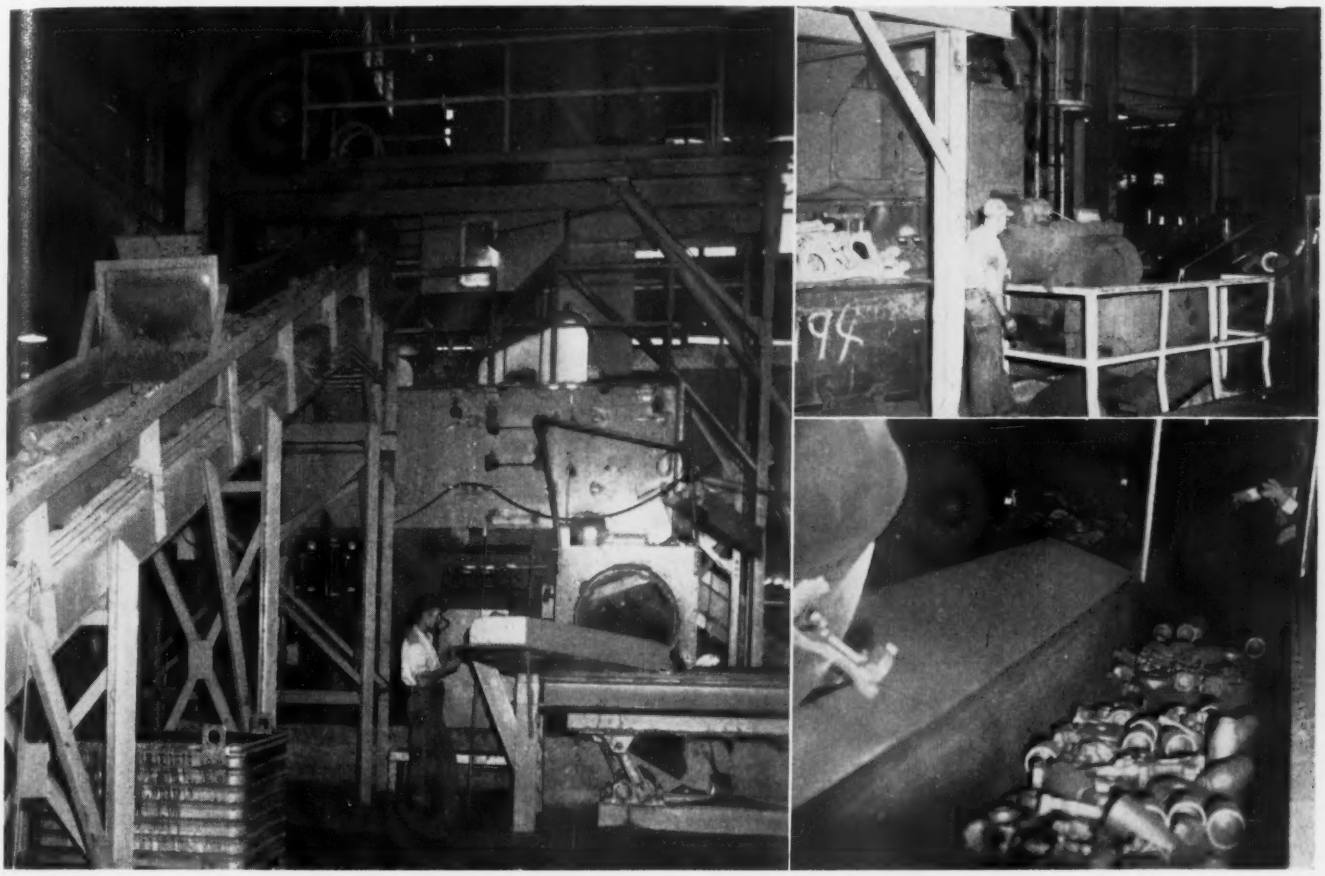
If you are quality conscious, it will pay you to consult with Carl - Mayer engineers. Write for Bulletin No.53-CM.

CORE OVENS, MOLD OVENS -- *all types*

THE CARL-MAYER CORPORATION
3030 Euclid Ave., CLEVELAND, OHIO

Backed by Over 30 Years' Experience

Pioneering Developments Keep **WHEELABRATOR®** *First in Blast Cleaning*



No operators needed . . . cleaning 500 tons daily

Continuous, automatic cleaning achieved with three Continuous Wheelabrator Tumblasts.

Automation . . . high speed automatic production . . . has spread to the cleaning room through the performance of Continuous Wheelabrator Tumblasts.

The midwestern gray iron and malleable foundries of a prominent automotive firm, for example, is achieving this highly-profitable, mass-production cleaning through use of three Continuous Wheelabrator Tumblasts. Operation of these units is completely automatic . . . conveyorized feeding and discharging of the work virtually eliminates the need for costly manual handling and machine operators.

Two of these high production machines are used for cleaning malleable castings at the combined rate of 25 tons hourly. In the gray iron foundry a similar unit cleans from 8 to 10 tons of miscellaneous castings hourly. Production rate of the cleaning machines is determined by speed of subsequent operations.

American pioneered the first continuous blast mill, and the sound engineering design and performance of this machine have been proved to the satisfaction of users in some of the nation's largest industries. At the Ford Cleveland Foundry, two of these units handle a combined tonnage of 20-24 tons per hour of gray iron castings.

Get the complete story!

Let us show you how one of these machines can be applied with cost-saving economy to your particular cleaning problem. One of our nearby field engineers will be glad to discuss this at your convenience. In the meantime write for literature.

Wheelabrator Steel Shot assures lowest overall cleaning costs. Write for Bulletin No. 89-A.

American

WHEELABRATOR & EQUIPMENT CORP.

505 S. Byrkit St., Mishawaka, Ind.

Wheelabrator® AIRLESS BLAST CLEANING

Manufacturers and Selling Agents: CONTINENTAL EUROPE—George Fischer, Ltd., Schaffhausen, Switzerland; BRITISH COMMONWEALTH—Tilghman's Patent Sand Blast Co. Ltd., Broadheath, England; JAPAN—Tokyo Boeki Kaisha, Tokyo; BRAZIL and ARGENTINA—Equipamentos Industriais EISA Ltda., Sao Paulo, Brazil; AUSTRALIA—McPherson's, Melbourne; MEXICO—Casco, S. De R. L., Mexico, D. F.

USE THIS NEW, FAST WAY

...to handle Ferro-Alloy briquets in your foundry

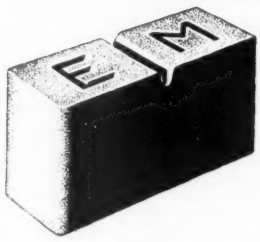
"EM" briquets can be stacked and shipped on pallets for convenient, fast handling. The pallets hold 4000 lb. of briquets and are available at no extra charge over bulk shipments. They can easily be unloaded and handled in your plant by lift truck or overhead crane. Handling time and costs are substantially reduced, and inventory-taking is simplified. The pallets are expendable and need not be returned.

In addition to pallets, shipments in bulk or in 250-lb. bags are available for those who prefer delivery in this manner.

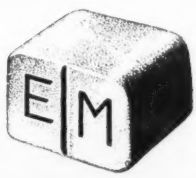
Contact the nearest ELECTROMET office for further information on how you can save with "EM" briquets.

The terms "Electromet" and "EM" are registered trade-marks of Union Carbide and Carbon Corporation.

SILICON



SILICOMANGANESE



FERROMANGANESE

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Electromet

TRADE-MARK

Ferro-Alloys and Metals

a Message to

THOMAS WESLEY PANGBORN
JOHN CLEMMER PANGBORN

on the Golden Anniversary of the Founding of the

PANGBORN CORPORATION

WE WANT to keep this simple. We don't want to use flowery language or embarrass you with elaborate praise, but we want to thank you for a lot of things. And, because we're proud of you, we're taking this page in *Foundry Magazine* to do it.

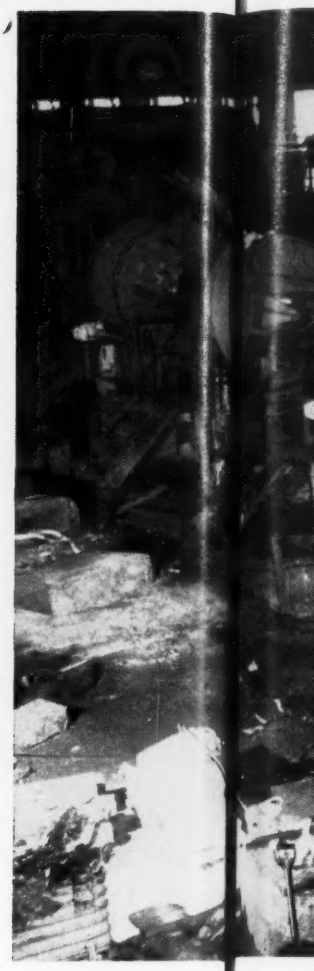
All of us have known you for twenty-five years or longer. During a quarter century of friendship, you get to know a man well. And, knowing you well, we thank you. For the fairness, the just manner in which you have conducted yourselves and your business all these years. For your generosity, in and out of the office, and the warm feeling that comes from being part of the Pangborn family. For the pleasure it has given us to work side by side with you . . . for the knowledge that, despite pressure of duties as the company has grown, you are still our friends.

Putting these things down on paper takes only a paragraph. Yet that paragraph encompasses our respect and affection, grown during many years of close association. We salute you for the past fifty years of guidance and inspiration . . . congratulations on our Golden Anniversary!

By all members of the Quarter Century Club of the Pangborn Corporation.

Allen, John T.
Andrews, Earl R., Sr.
Artz, Bruce R.
Bachtell, Daniel B.
Boone, William D.
Bottorf, Henry F.
Brezler, Clarence C.
Buhrman, Charles F.
Bultman, Charles A.
Cline, Emory H.
Connolly, John H.
Dayton, Samuel H.
Diehl, Pomeroy D.
Dieterich, Edgar L.
Easton, Howard W.
Everly, Clarence W.
Finniff, Ernest W., Sr.
Garver, Ralph R.
Gossard, Charles M.
Grandstaff, E. G.
Green, George W.
Hartman, Edward L.
Holmes, Sylvester D.
Hose, Ellsworth L.
Jaynes, Sidney B.
Johns, Laurence M.
Kaetzel, Charles E.
Kaiss, Frank
Kidwell, Carroll O.
King, William E.
Kline, Harvey D.
Kline, Lewis B.
Kline, Paul M.
Knott, Ernest A.
Koontz, William R.
Lewis, George W.
Lowman, Lee R.
McCauley, Robert H.
McKinsey, H. Maurice
Martin, Richard E.
Mehrling, George P.
Mellott, Charles N.
Middlekauff, William L.
Morganthall, Richard M.
Morris, Leonard C.
Mullendore, Donald B.
Munson, Richard C.
Neikirk, Howard C.
Nigh, William F.
Nitzell, A. Preston
Oberholzer, Aaron
Osborne, Perry E.
Ovelman, Thomas W.
Pike, George D.
Pike, Ira M.
Piper, G. Leroy
Poe, G. Edward
Poffenberger, Arthur F.
Poffenberger, Gerald
Poffenberger, Norman M.
Potter, P. J.
Price, Howard C.
Ridenour, Edward L.
Rodgers, John F.
Rohrer, Max R.
Routzahn, Charles V.
Schellhase, Howard E.
Shank, Leonard R.
Shilling, John F.
Shoemaker, William A.
Shuman, Robert P.
Smith, Charles A.
Spigler, Charles B.
Spigler, Ray E.
Sprecher, Harry M.
Stine, Victor F.
Stouffer, Lloyd L.
Symons, Harry J.
Trovinger, Harold C.
Vedder, W. O.
Wagner, Leonard W.
Wilhelm, Walter L.
Willis, J. O.
Wilson, Charles E.
Yeakle, Berkley C.
Zentmyer, Harry C.

32-YEAR-OLD QUINTUPLETS GREW UP AT 2500°



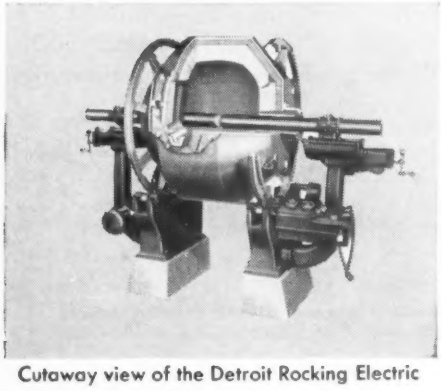
5 DETROIT ROCKING ELECTRIC FURNACES FOR EVERDUR INGOT PRODUCTION AT DETROIT PLANT OF AMERICAN BRASS

Melting tough Everdur alloy calls for a furnace that can produce uniform results at high, controlled temperatures. To meet these requirements, the American Brass Company installed five Detroit Electric Furnaces in their Detroit Plant back in 1921. Today, these 'quints' are still in the foundry. Two of them run 16 to 24 hours per day turning out huge 6300-lb. ingots of Everdur.

The dependability of Detroit Rocking Electric Furnaces—at American Brass and in plants throughout the world—is measured in both furnace performance and melt results. They give years of economical, trouble-free service and deliver metal of consistent quality through heat after heat. Sound design plus many exclusive engineering features account for this dual dependability.

Detroit's indirect arc heat provides fast, controlled melting of ferrous or non-ferrous metals while holding alloy variation and carbon pick-up to a minimum.

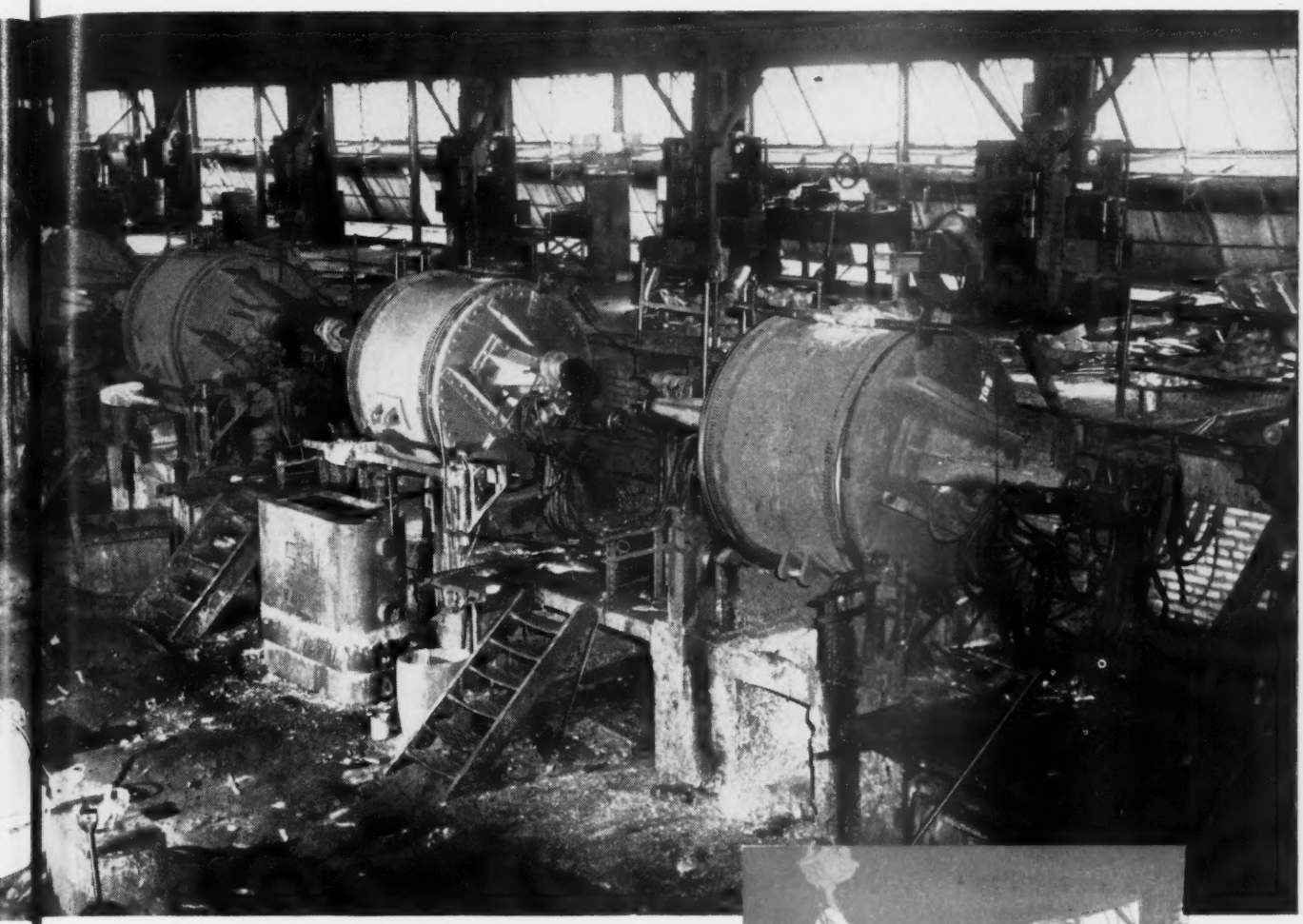
Controlled rocking action of Detroit Electric Furnaces has many advantages. The molten metal is



Cutaway view of the Detroit Rocking Electric Furnace, showing engineering and construction features. Rocking action assures maximum heat utilization.

DETROIT ELECTRIC

Kuhlman Electric Company



washed over a large area of the refractory for greater utilization of heat and longer refractory life. And constant motion assures homogeneity of the metal. With automatic rocking control, the most favorable melting cycle can be duplicated, assuring uniform melts at optimum power consumption.

Economy features include less metal shrinkage; more usable metal per heat; less down time because of longer refractory life, easy shell replacement.

Write today for full information on Detroit Electric Furnaces and how they can do a better job for you.

Furnace capacities from 10 to 4000 pounds.

Pouring a 6300-lb. ingot of Everdur at American Brass. Ladle and furnace pour simultaneously to assure uniform hardening.

FURNACE DIVISION

Bay City, Michigan

Foreign Representatives: in BRAZIL—Equipamentos Industrias, "Eisa" Ltd., Sao Paulo; CHILE, ARGENTINA, PERU and VENEZUELA: M. Castellvi Inc., 150 Broadway, New York 7, N. Y.; MEXICO: Cia Proveedora de Industrias, Atenas 32-13, Apartado 27A3, Mexico 6, D. F., Mexico; EUROPE, ENGLAND: Birlec, Ltd., Birmingham.

500,000 castings without a reject by using RESINOX 1128 bonded shells

Gray iron is poured into 34 molds from one ladle as they pass on a conveyer belt. Permeable sand-Resinox 1128 shell molds permit gases to escape, eliminate many metallurgical defects such as blowholes, porosity and cold shuts.

That's the record of Midwest Foundry Co., Coldwater, Michigan

Half a million items, cast to a tolerance of .010" without a single reject . . . labor costs reduced more than half . . . 12 pounds of finished product for every 15 pounds of metal poured . . . elimination of machining on intricate designs . . . 20% lighter molds, on the average . . . up to 4 times more production per man hour—these shell molding advantages reported by Midwest Foundry Company are typical of those experienced by foundries throughout the country.

"We are producing a cylinder liner with thin vertical walls demanding very close tolerances, by shell molding with Monsanto Resinox 1128," reports Mr. Albert H. Doerr, Chief Engineer. "The high flow characteristics of Resinox 1128 combined with the integral core features of shell molding give us high quality finish, clean stripping and closer dimensional tolerances than with any other combination . . . and we are getting these results with an exceptionally low 5% resin-to-sand ratio."

The success of the shell molding process is heavily dependent on the quality of the resins used. That's why more and more foundries are specifying Monsanto *Resinox* shell molding resins to get consistently better castings at lower cost. You'll find that research-proved and shop-tested Monsanto foundry resins will meet your most exacting production requirements.

For complete information on Resinox shell molding resins, phenolic and Resimene urea resins for core binding, and Lytron sand conditioner for conventional sand casting, mail the convenient coupon today. Resinox: Reg. U. S. Pat. Off.

MONSANTO CHEMICAL COMPANY, Plastics Division, Room 5708
Springfield 2, Mass.

Please send me complete information on:

☐ Resinox shell molding resins; ☐ Monsanto phenolic resins; ☐ Monsanto core binding resins; ☐ Lytron sand conditioner.

Name & Title

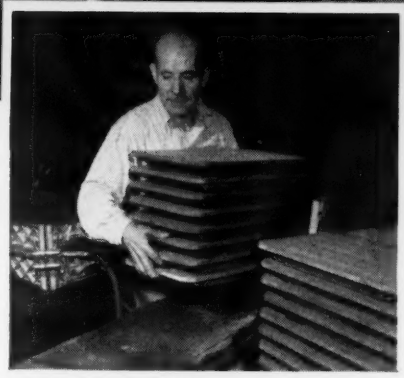
Company

Address

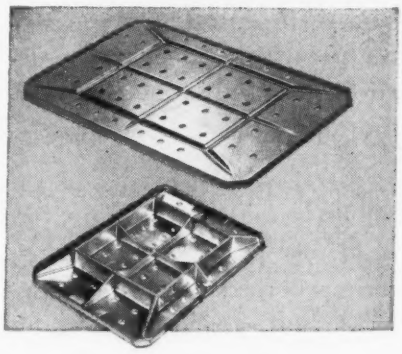
City, Zone, State

MONSANTO

SERVING INDUSTRY...WHICH SERVES MANKIND



Molder finds EDCO Dowmetal Bottom Boards are light, easy to handle and stack.



"We cut our board losses from 7500 down to 12 . . . by switching to EDCO Dowmetal Bottom Boards"

— says R. D. BAYSINGER, Manager, Foundry Division
GREENLEE BROS. & CO., ROCKFORD, ILLINOIS

Analysis of five-year records at the Foundry Division of Greenlee Bros. & Co. revealed a loss of only 12 Edco Dowmetal Bottom Boards, in contrast to a normal loss of 7500 wood boards during the same period of time.

"Further," says Baysinger, "we estimate *our scrap loss has been cut 20% since switching to Edco.*" Benefits like these are typical. For example, another Edco user commented, "Our old wood boards had a life of about two weeks; and toward the end of their life-span, they always produced some poor castings which had to be rejected." Edco Dowmetal Bottom Boards are different: they stand up under constant use . . . and keep casting quality up, too.

Add to this the fact they are light, easy to handle—stack in small space, easily and securely—and you'll see why it's "good business" to switch to Edco.

Write us, or phone CApitol 7-2060 for price schedule and list of 78 standard sizes available from stock.

CHRISTIANSEN CORPORATION

210 SOUTH MARION ST.
OAK PARK 1, ILLINOIS
ALUMINUM ALLOY INGOTS

AIR POLLUTION

IS AS CLOSE AS YOUR PARKING LOT!

Dust Covered Cars Offer *VISUAL PROOF* That a Dust Control Problem Is Just *HALF LICKED*

TAKE a look at the cars in your parking lot. They quickly show the effects of settled materials, many of which damage automotive finishes in surprisingly short periods of contact time.

If such dust is a source of irritation and expense to your employees, you can be sure that it is equally offensive to the surrounding neighborhood.

It's a problem resulting from half-way measures —solving inside dust problems at the expense of outside areas.

The solution is *complete* dust control as provided by AAF equipment. Dynamic precipitators, hydrostatic precipitators, dry centrifugals, fabric arresters—you'll find them all in the AAF line. There's a unit to cope with *any* type of dust—*completely.*

Let your parking lot be the metering device for dust conditions in your plant area. Your local AAF representative will check your dust sources and recommend effective, economical means of control. Call him today or write us direct.

AAF EQUIPMENT DOES THE *COMPLETE* JOB —INSIDE *AND* OUT.

AAF

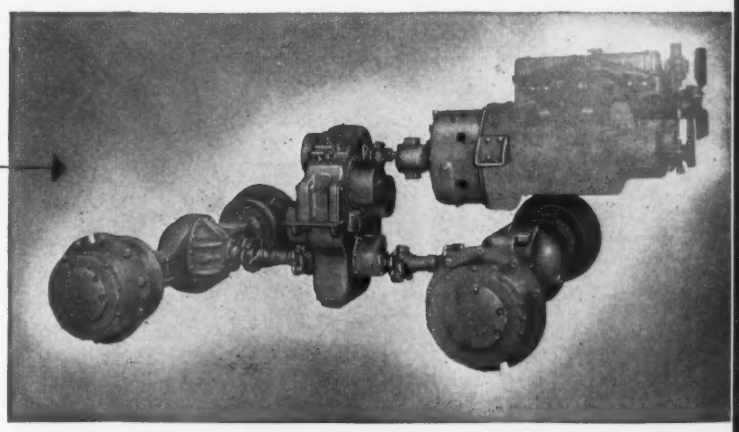
American Air Filter

COMPANY, INC.

American Air Filter of Canada, Ltd., Montreal, P. Q. • 266 Central Avenue, Louisville 8, Kentucky

Here's Why The **MICHIGAN** *Tractor Shovel*
WILL DO MORE WORK FOR YOU!

* *This Power Train — from engine to tires — engineered and manufactured by Clark*



* **CLARK TORQUE CONVERTER** — 3-to-1 multiplication factor provides maximum torque *when it is needed.* Precise control in inching and digging.

* **CLARK POWER-SHIFT TRANSMISSION** —no conventional clutch; four speeds forward and reverse—direction control by lever on the steering column.

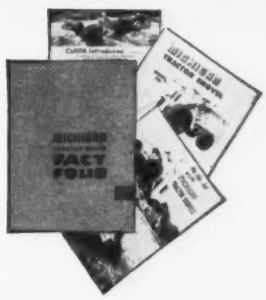
* **CLARK PLANETARY DRIVE AXLE** — final reduction in the wheel reduces the torque load on all gears and shafts.

RESULT — easier operation, utmost accessibility and simplicity of servicing, highest efficiency in shovel handling.

ADD greater weight and more horsepower than any front-end loaders of comparable capacity, and you see why you can Move More with a MICHIGAN*.

*A Trademark of Clark Equipment Company

For full information send for the MICHIGAN Tractor Shovel Fact-Folio —specifications, action photos, magazine article. The coupon will bring your copy.



CLARK EQUIPMENT

14C

CLARK EQUIPMENT COMPANY, Construction Machinery Division
442 Second Street, Benton Harbor, Michigan, U. S. A.

Please send the MICHIGAN Tractor-Shovel Fact-Folio

Name_____ Title_____

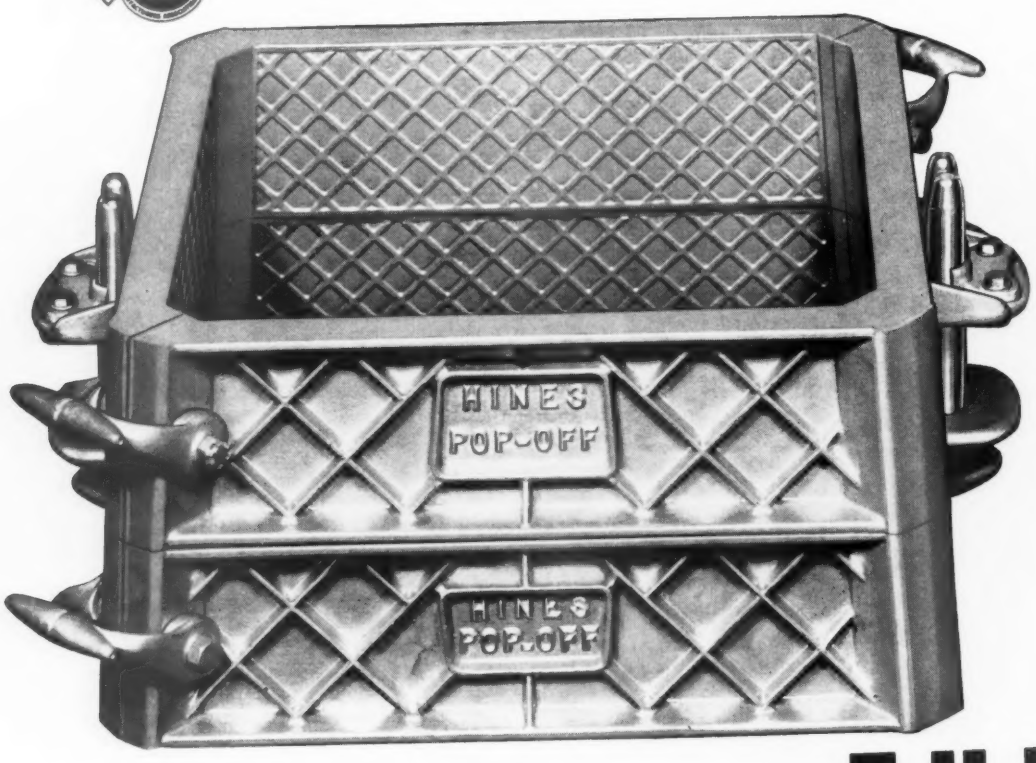
Firm Name_____

Address_____

City_____ Zone_____ State_____

nothing

HINES
POP-OFF
FLASK
FEMA

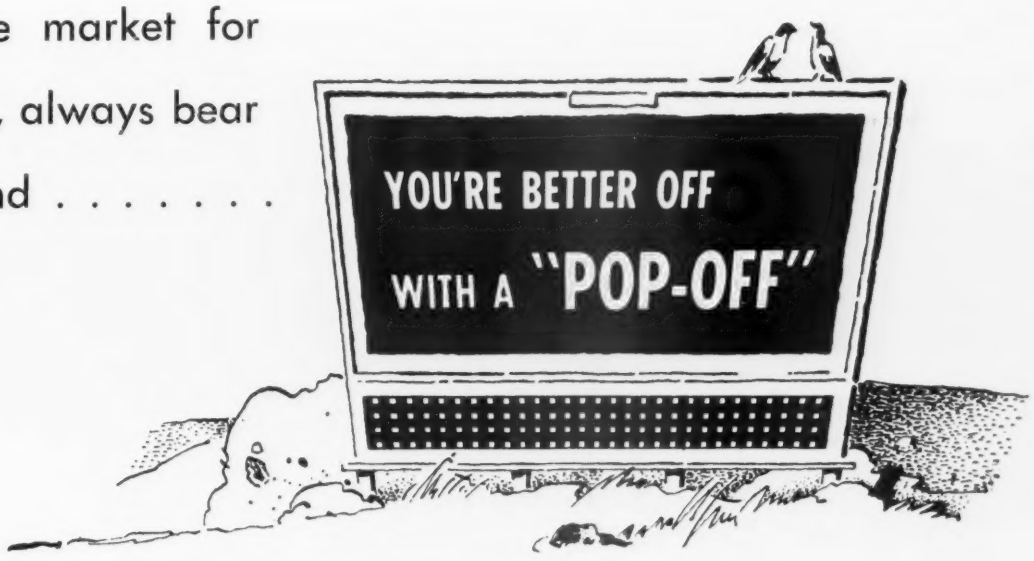


THE

else like it!

Right! There's nothing like a Hines "POP-OFF" Flask for long, satisfactory service. Fixture-built and extremely accurate to insure more perfect molds, with less scrap. And the patented "POP-OFF" feature eliminates hammering or shakeout, saves time and money.

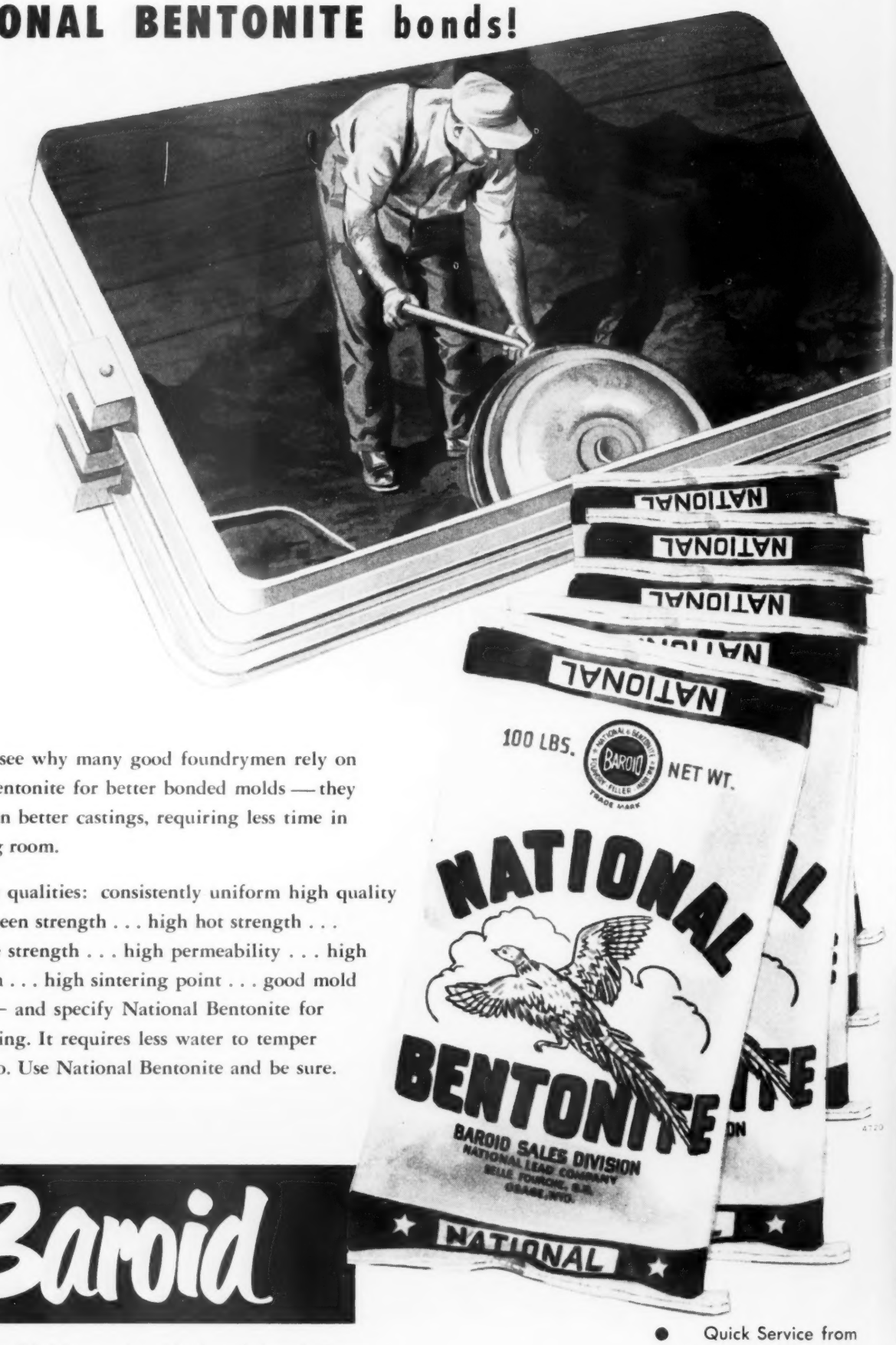
Whenever you're in the market for flasks, always bear in mind . . . . . .



HINES FLASK CO.

3431 WEST 140TH STREET • CLEVELAND 11, OHIO • PHONE ORCHARD 1-2806

. . . Finer finished castings with NATIONAL BENTONITE bonds!



It's easy to see why many good foundrymen rely on National Bentonite for better bonded molds — they can count on better castings, requiring less time in the cleaning room.

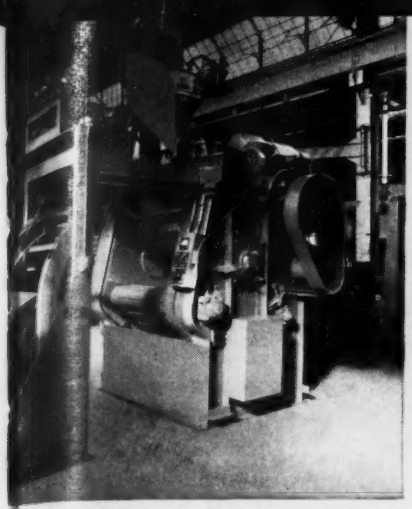
Check these qualities: consistently uniform high quality . . . good green strength . . . high hot strength . . . high tensile strength . . . high permeability . . . high deformation . . . high sintering point . . . good mold durability — and specify National Bentonite for better bonding. It requires less water to temper correctly, too. Use National Bentonite and be sure.

Baroid

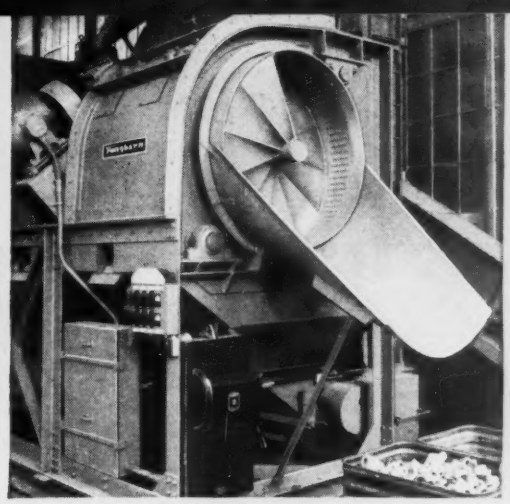
Baroid Sales Division ☆ National Lead Company

Bentonite Sales Office: Railway Exchange Building, Chicago 4, Illinois

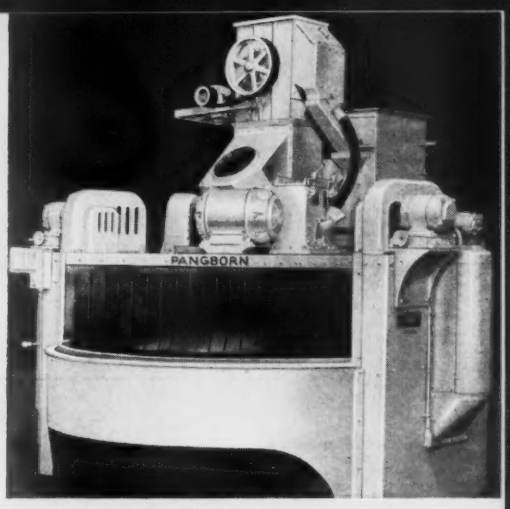
● Quick Service from Better Foundry Suppliers Everywhere



Pangborn Blastmaster® Barrels for top efficiency in batch cleaning. Newest addition to Pangborn line, features abrasive-tight door and automatic throw-out torque arm.



Pangborn Continuous-Flo ROTOBLAST Barrels for cleaning steady flow of miscellaneous work quickly. Operated by one man on production line basis.



Pangborn ROTOBLAST® Tables for semi-continuous blast cleaning. Types and sizes for castings of all sizes, surfaces, intricate shapes, and pockets.

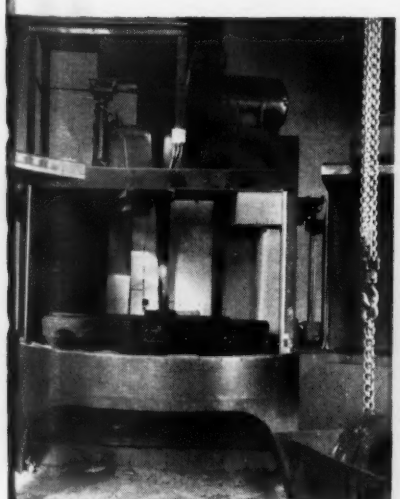
Pangborn's 50 years of progress

offer you a complete line of equipment for every blast cleaning and dust control need

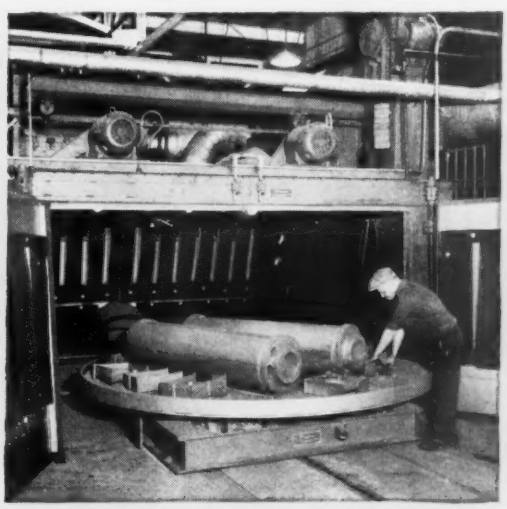
Fifty years of know-how . . . a half-century of research and development . . . and today Pangborn Blast Cleaning and Dust Control Equipment promises *and delivers* better, faster, cheaper performance on any foundry job. Shown here are just a few machines from Pangborn's *complete line* of equipment.

Pangborn engineers and equipment can save *you* time, labor, and money. Our engineers will be happy to work closely with you, in recommending the exact Pangborn unit you need, and in developing new equipment when necessary. No matter what you clean —large or small castings, ferrous or non-ferrous work . . . or whatever dust problem you have, it will pay you to find out how Pangborn can help you.

Send for the Pangborn bulletins that fit your needs. Write: PANGBORN CORPORATION, 1400 Pangborn Blvd., Hagerstown, Md.



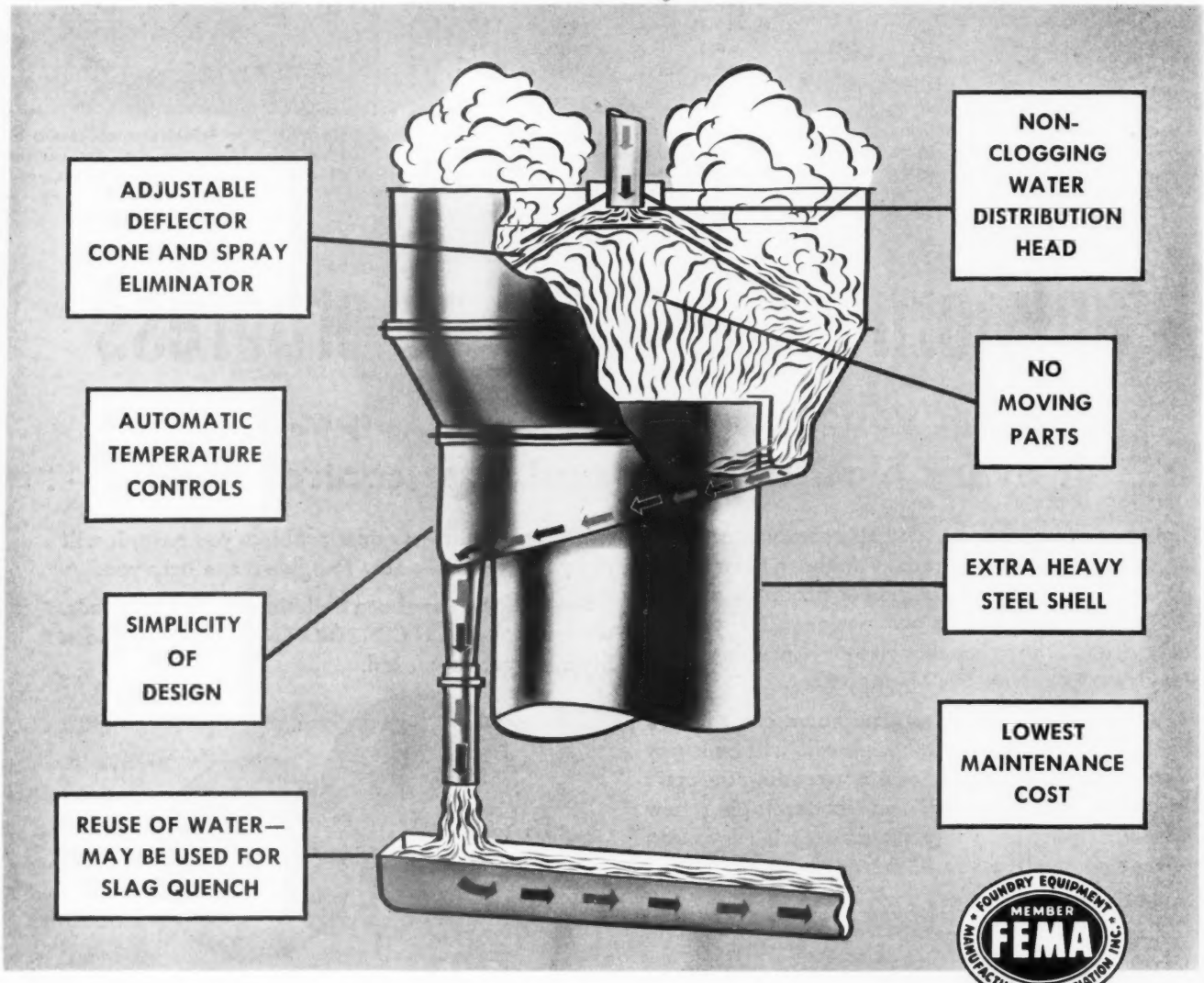
ngborn ROTOBLAST Table-Rooms clean castings m a few pounds to 2½ tons. Extremely efficient jobbing foundries. Perfect for all-purpose st cleaning.



Pangborn Airless ROTOBLAST Rooms for general blast cleaning of extra-large and miscellaneous castings. Operated from outside.

Pangborn Dust Control Equipment to reduce housekeeping costs, minimize dust damage to machinery, improve employee morale and community relations. For any size requirement.

What to look for in the cupola collector you may buy!


ADJUSTABLE DEFLECTOR CONE AND SPRAY ELIMINATOR
AUTOMATIC TEMPERATURE CONTROLS
SIMPLICITY OF DESIGN
REUSE OF WATER— MAY BE USED FOR SLAG QUENCH
NON-CLOGGING WATER DISTRIBUTION HEAD
NO MOVING PARTS
EXTRA HEAVY STEEL SHELL
LOWEST MAINTENANCE COST
FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION INC. MEMBER FEMA

Here you can see the simplicity of the Schneible Cupola Collector, type "SW".

The success of this collector is the result of scores of years of research and far-sighted planning to provide equipment to meet today's demands for simple, efficient fly-ash control in our modern foundries. This collector also conforms to most codes throughout the country.

For simplicity and efficiency of operation the "SW" Cupola Collector has no equal. Schneible patented features assure the lowest possible maintenance cost and a longer, more useful life.

It will pay you to check with your local Schneible representative or, if you like, call us collect at the main office.

CLAUDE B. SCHNEIBLE COMPANY
P. O. Box 81, North End Station • Detroit 2, Michigan

Cable Address: CBSCO
European Licensee: Elex S. A., Zurich, Switzerland

SCHNEIBLE

Write for Bulletin 554 without obligation

LATE NEWS

AUGUST 26 1954

SHELL MOLD FOUNDRY: Limited production has been started by Lynchburg Foundry Co. at its $1¼ million plant addition for the manufacture of shell mold castings. Capacity is placed at more than 100 tons a day of gray iron and nodular iron castings. The new facilities, located at Lynchburg, Va., incorporate 14 molding stations and coremaking equipment. Two new hot-blast cupolas equipped with water-cooled tuyeres have been installed. A special cupola forehearth arrangement is provided for the controlled end treatment of various grades of gray iron and the production of nodular iron. Full operations are expected by the end of October.

FEMA IN WASHINGTON: Headquarters of the Foundry Equipment Manufacturers Association have been moved to Washington, with offices at No. 1 Thomas Circle. In charge will be C. R. Heller, newly appointed secretary-treasurer. For the last seven years he headed the Washington office of Link-Belt Co. FEMA headquarters formerly were in Cleveland where for the last 17 years they were under the direction of the Arthur J. Tuscany Organization, association management and consulting firm of that city.

TO MERGE PIPEMAKING: Hajoca Corp. plans to consolidate its production of cast iron soil pipe and fittings at its Quakertown, Pa., plant. Operations at its Lansdale, Pa., foundry are expected to be suspended within the next month or two.

NODULAR IRON: Meehanite Metal Corp. has developed what it says is an improved and simplified method for the production of nodular iron. Ductliron is the registered trademark applied to castings made by the process.

RAILROADS RETRENCH: Slow demand for railroad equipment is one factor in the decline in shipments of steel castings so far this year. Shipments of cast steel railway specialties are off more than 50 per cent compared with 1953. July orders for freight cars totaled only 883 units. Backlog of car builders as of Aug. 1 was 12,889, a decrease of more than 35,000 since a year ago.

RECORD IN ALUMINUM: Production of primary aluminum in the United States set a new record in July at more than 126,000 tons. This brought output for the first eight months to 841,500 tons, against 708,000 tons a year ago. Because of the good supply-demand picture, the Office of Defense Mobilization has called off proposed additional expansion in aluminum production capacity. New facilities now being provided and to be completed shortly will bring primary capacity to 1,540,000 tons annually. Production in 1950 was 719,000 tons.

OBITUARY: James Mitchell, 71, former president of the Cleveland Co-operative Stove Co., died in Cleveland Aug. 20 . . . August E. Miller, 53, superintendent of the malleable foundry of International Harvester Co., Chicago, died Aug. 11 in Brookfield, Fla., while on vacation . . . Walter L. Patten, 65, vice president and sales manager of the Atlas Foundry Co., Cleveland, died there Aug. 19.

GRADUATES: The first class of the foundrymen's training center at the Indian Institute of Technology, Kharagpur, India, was graduated recently. Twenty foundrymen—most of them foremen—received three months of training under the direction of John F. Schnur, foundry technologist of Armour Research Foundation of Illinois Institute of Technology, Chicago. A second course is scheduled for this fall.

TO SELL FOUNDRY: Magic Chef Inc., St. Louis, has closed the Indianapolis foundry of its subsidiary, Federal Foundry Co. Inc., and is offering it for sale. The company will buy its castings hereafter.

CENTENARIAN: Springfield Foundry Co., gray iron castings producer of Springfield, Mass., has completed 100 years in business. In 1883 David Hale acquired an interest in the business, and the third generation of his

family operates the company today. The plant has a daily capacity of 35 tons of castings in sizes ranging up to 5 tons.

FOUNDRY COURSE: A free practical course in foundry practice will be conducted two evenings a week by the Machine & Metal Evening Trade School, 321 East 96th St., New York. A short course covers 50 hours and a full course 100 hours. Registration will be held the evenings of Sept. 13-14.

NEW NAME: Industrial Furnace Manufacturers Association Inc. has changed its name to Industrial Heating Equipment Association Inc. Revision by the 25-year-old organization reflects inclusion in its membership of induction and dielectric heating equipment manufacturers.

PERSONALS: George Perkins, general director of products and applications for Reynolds Metals Co., has been appointed director of the Aluminum-Magnesium Division, BDSA, Washington, for the ensuing six months . . . Carl R. Sare, recently vice president of the W. W. Sly Mfg. Co., Cleveland, has been named president, succeeding Frank W. Klatt, retired.

MISCELLANY: General American Transportation Corp., Chicago, has acquired the Fuller Co., Catasauqua, Pa., manufacturer of air compressors and pneumatic conveying systems. The transfer includes the latter's subsidiary, Hershey Machine & Foundry Co., Manheim, Pa. . . . J. P. Hansen Foundry Co. Inc., Chicago, has resumed operations after several months of inactivity during which the shop was equipped to produce light as well as heavy gray iron castings . . . Aluminum Co. of America has raised the price of 99 per cent aluminum ingot by 0.7-cent to 22.2 cents per pound . . . Ford Motor Co.'s Cleveland foundry recently topped one million man-hours of work without a lost-time accident. The average gray iron foundry has 30 accidents during that exposure period . . . Price index of foundry and forge shop products in July was 128.8 per cent of the 1947-49 average, against 129.3 in June and 127.2 a year ago, according to the U. S. Department of Labor.

PRICES OF FOUNDRY METALS AND COKE

(As of Aug. 26, 1954)

FOUNDRY COKE

(Per net ton, f.o.b. ovens)

BEEHIVE	
Connellsville	$16.50–17.00
OVEN	
Birmingham	$22.65
Buffalo	25.00
Chicago	24.50
Detroit	25.50
Erie, Pa.	25.00
Everett, Mass.	23.50
Indianapolis	24.25
Kearney, N. J.	24.00
Milwaukee	25.25
Painesville, O.	25.50
Philadelphia	23.00
Portsmouth, O.	24.00
St. Louis	26.00
St. Paul	23.75
Swedeland, Pa.	23.00
Terre Haute, Ind.	24.05

PIG IRON

(Per gross ton f.o.b. furnace)

	No. 2 Foundry	Malleable
Bethlehem, Pa.	$58.50	$59.00
Birmingham	52.88	....
Buffalo	56.50	57.00
Chicago	56.50	56.50
Cleveland	56.50	56.50
Everett, Mass.	61.00	61.50
Fontana, Calif.	62.50	....
Geneva, Utah	56.50	....
Granite City, Ill.	58.40	58.90
Lone Star, Tex.	52.50	52.50
Neville Island (Pittsburgh)	56.50	56.50
Steelton, Pa.	58.50	59.00
Swedeland, Pa.	58.50	59.00
Toledo, O.	56.50	56.50
Troy, N. Y.	58.50	59.00
Youngstown, O.	....	56.50

NONFERROUS INGOT

(Cents per pound, carlots)

BRASS AND BRONZE: Red brass, No. 115, 27.00; tin bronze, No. 225, 39.00; No. 245, 33.25; high-leaded tin bronze, No. 305, 31.50; No. 1 yellow, No. 405, 23.25; manganese bronze, No. 421, 26.75.

ALUMINUM: 99 per cent plus, primary ingots 22.2. Secondary No. 12 alloy 19.75-20.25. Deoxidizing grades: No. 1 21.00-21.50; No. 4 18.00-18.50.

MAGNESIUM: 99.8 per cent standard ingots 27.00c, f.o.b. Freeport, Tex.

COPPER: Electrolytic 30.00, delivered Connecticut valley.

ZINC: High grade 12.35, delivered. Die casting alloy 15.00, delivered.

IRON AND STEEL SCRAP

(Consumer prices per gross ton delivered, except as otherwise noted)

	No. 1 Heavy Melting Steel	No. 1 Cupola Cast	Heavy Breakable Cast	Clean Auto Cast	Machinery Cast	Malleable	Short Steel Rails
Birmingham	$19.50–20.50	**$43.50–44.50	.....	.....	.....	.....	$40.00–41.00
Boston*	**18.50–19.00	**29.00–30.00	.....	.....	**32.00–33.00	.....	.....
Buffalo	26.00–27.00	**35.00–36.00	.....	.....	**39.00–40.00	.....	40.00–41.00
Chicago	29.00–31.00	35.00–36.00	.....	37.00–38.00	37.00–38.00	40.00–42.00	43.00–45.00
Cincinnati*	**25.50–26.50	**38.00	**35.00	.....	**44.00	.....	**43.00–44.00
Cleveland	28.00–29.00	41.00–42.00	25.50–26.50	43.00–44.00	42.00–43.00	41.00–42.00	43.00–46.00
Detroit*	**22.50	**33.00	**23.00	**37.00	.....	**23.00	.....
Los Angeles	20.00	**38.00–42.00	.....	.....	.....	.....	.....
New York*	21.00–21.50	29.00–30.00	.....	.....	.....	.....	.....
Philadelphia	27.00–28.00	35.00–36.00	36.00–36.50	.....	36.00–36.50	37.00	.....
Pittsburgh	29.00–30.00	34.00–35.00	30.00–31.00	.....	42.00–43.00	.....	43.00–45.00
St. Louis*	25.50	37.00	29.00	39.00	.....	.....	41.00
San Francisco	20.00	43.00–46.00	36.00	39.00	43.00	.....	.....
Seattle	25.00	**34.00–35.00	**25.00	.....	.....	.....	.....

*Brokers' buying prices. **F.o.b. shipping point.

HYGEIA SEACOAL WINS BY 800 TO 1 IN DUST COUNT TEST by Independent Industrial Health Laboratory

Keep Your Foundry Dust–Free. Enjoy These Positive Advantages

1. Permanently dust-free
2. Cleaner handling
3. Less material lost
4. Improved flowability
5. More economical

Write for Literature

"A dust count was made by the impinger method with the following results:

Samples collected from 5½ to 10½ minutes after dispersion —

416 million particles of Regular Seacoal per cu. ft. of air.

½ million particles of HYGEIA SEACOAL per cu. ft. of air."

(This means 800 particles of Regular Seacoal in the air or up exhaust to 1 particle of HYGEIA SEACOAL

"Samples collected from 19½ to 24½ minutes after dispersion —

239 million particles of Regular Seacoal per cu. ft. of air.

½ million particles of HYGEIA SEACOAL per cu. ft. of air."

(400 particles of Regular Seacoal to 1 particle of HYGEIA SEACOAL

"The counts of less than one million particles approach the range of normal room air and the small differences between counts below one million are not considered significant."

AIR USING HYGEIA SEACOAL

HYGEIA SEACOAL SOLD UNDER UNCONDITIONAL GUARANTEE TO CONFORM TO OUR CLAIMS

AIR USING REGULAR SEACOAL

PENN-RILLTON COMPANY

324 West 23rd Street, New York 11, N. Y.

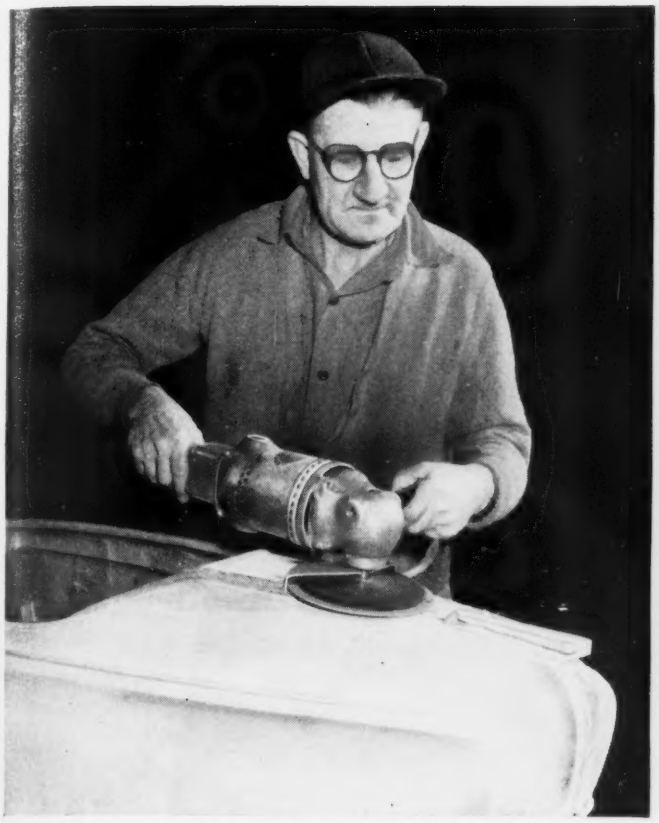
NEW ENGLAND OFFICE
17 Exchange Place, Providence, R. I.

Manufacturers of: "Facemols", Shake-On, Spray-On, Hygeia Seacoal, Blended Core Compounds

MX® abrasive products finish as they cut...resist loading even on soft metals, alloys

● Deburring and finishing with MX Mounted Wheel

continually putting **MORE SENSE** in your **ABRASIVE DOLLAR**



● Smoothing seam of welded aluminum casting with MX Disc

● Portable cutting-off with MX Depressed Center Wheel

Fast, clean-cutting MX abrasive products by CARBORUNDUM *finish* as they cut...whether you are removing stock, surfacing, grinding welds, cutting-off or slotting. The resilient composition of MX products produces a soft, cushion-like cutting action—without chatter—that promotes smooth, uniform finishes. They resist loading... even on the soft metals like copper, magnesium, aluminum, or aluminum alloys.

FOR CUTTING-OFF AND SLOTTING operations, MX Production Cut-off Wheels combine rapid cutting with adequate safety... successfully withstand side pressures and heat shock. MX Depressed Center Wheels are also recommended for light cut-off and slotting with portable equipment—as are MX General Purpose Cut-off Wheels.

FOR ROUGH GRINDING, reducing and blending welds, use MX Discs, Depressed Center Wheels or Straight Wheels—depending on the nature of the job.

FOR FINISHING, polishing, deburring, etc., choose the MX abrasive product that best fits the operation; Straight Wheels, Mounted Wheels, Sticks for hand finishing, Depressed Center Wheels, Discs.

FIND OUT TODAY how these versatile MX abrasive products can help lower your costs, speed your production. Call your CARBORUNDUM Distributor or Salesman, listed in the yellow pages under "Abrasives" or "Grinding Wheels." He offers expert counsel, prompt delivery from complete stocks.

SEND FOR

FREE BOOKLET

ON MX ABRASIVE PRODUCTS

THE CARBORUNDUM COMPANY, Dept. F 81-44
Niagara Falls, New York.

Rush my copy of Booklet No. 3, "MX Products"

NAME

COMPANY

STREET AND NUMBER

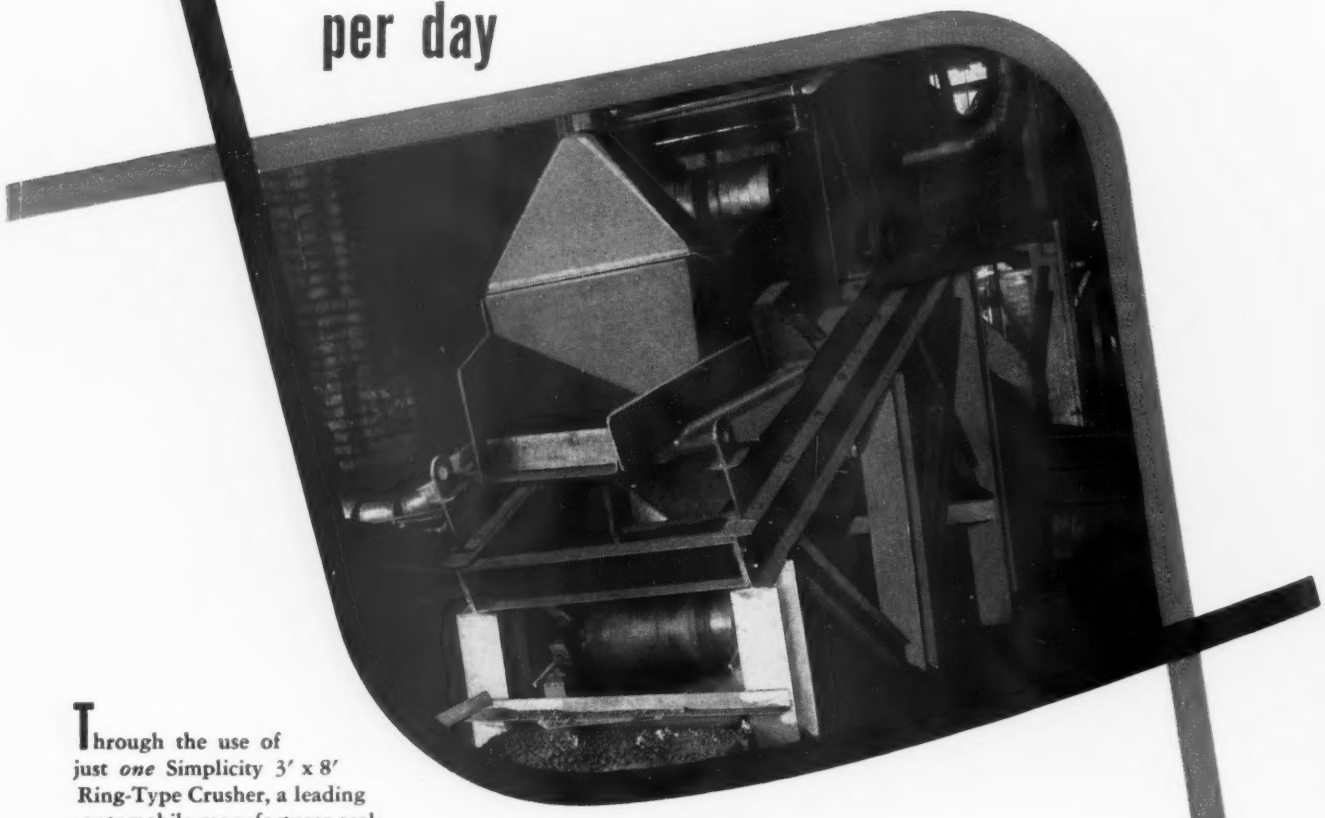
CITY ZONE STATE

CARBORUNDUM

REGISTERED TRADE MARK

81-44

simplicity 3′ x 8′ ring-type crusher recovers about 400 tons of sand per day



Through the use of just *one* Simplicity 3′ x 8′ Ring-Type Crusher, a leading automobile manufacturer realizes savings of about 400 tons of sand daily in grey-iron foundry operations. In this installation, lumps of sand, especially those from cores that do not break up in shakeouts or screening, are fed to the Simplicity Crushing Screen instead of being hauled to the dump, as is the practice in many foundries. The recovered sand is returned by conveyor to sand storage and mulling equipment thus making appreciable savings in new sand requirements as well as eliminating the cost of hauling away sand lumps. With a Simplicity, one unit does both crushing and screening. It gives positive crushing action and maximum production of grain-size sand. Simplicity Crushers are available with either one, two, or three sets of rings, depending on the lump size to be crushed.

Simplicity Crushing Screens are in profitable operation today in foundries producing magnesium, aluminum, steel, malleable iron, and grey iron castings . . . why not put one to work in your foundry?

A Simplicity sales engineer will be glad to give you the full story. Write us.

103

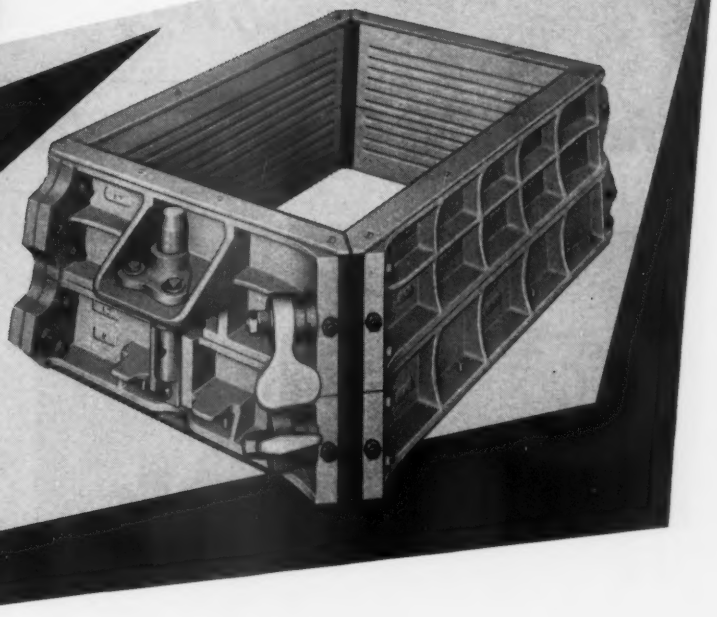
Sales representatives in all parts of the U. S. A.

FOR CANADA: Canadian Bridge Engineering Company, Ltd., Walkerville, Ontario

FOR EXPORT: Brown and Sites, 50 Church Street, New York 7, N. Y.

Simplicity
TRADE MARK REGISTERED
ENGINEERING CO. • DURAND, MICHIGAN

TWICE AS STRONG
A Third Lighter



—that's why magnesium is so popular for flask construction...

Magnesium has twice the tensile strength of aluminum, thus assuring longer service, and magnesium weighs 1/3 less than aluminum, making for easier handling.

FREMONT MAGNESIUM FLASKS

with their accurately machined inside surfaces and flanges and steel-faced top and bottom flanges, assure more exacting work.

THE NEW FREMONT SPREADLOCK FLASKS

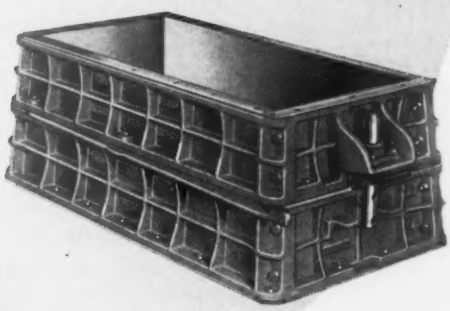
have long-life, easily replaceable, live-rubber corner inserts which completely close the corner gaps so that no sand can lodge in the open corners.

PERFECT ALIGNMENT INDEFINITELY!

is guaranteed by the one-inch GROOVLOCK FOOLPROOF PIN on

FREMONT STANDARD SLIP FLASKS

Particularly adapted to cope or drag pattern jobs. Solid, bolted and welded corner construction. Other types of standard pin fittings also available.



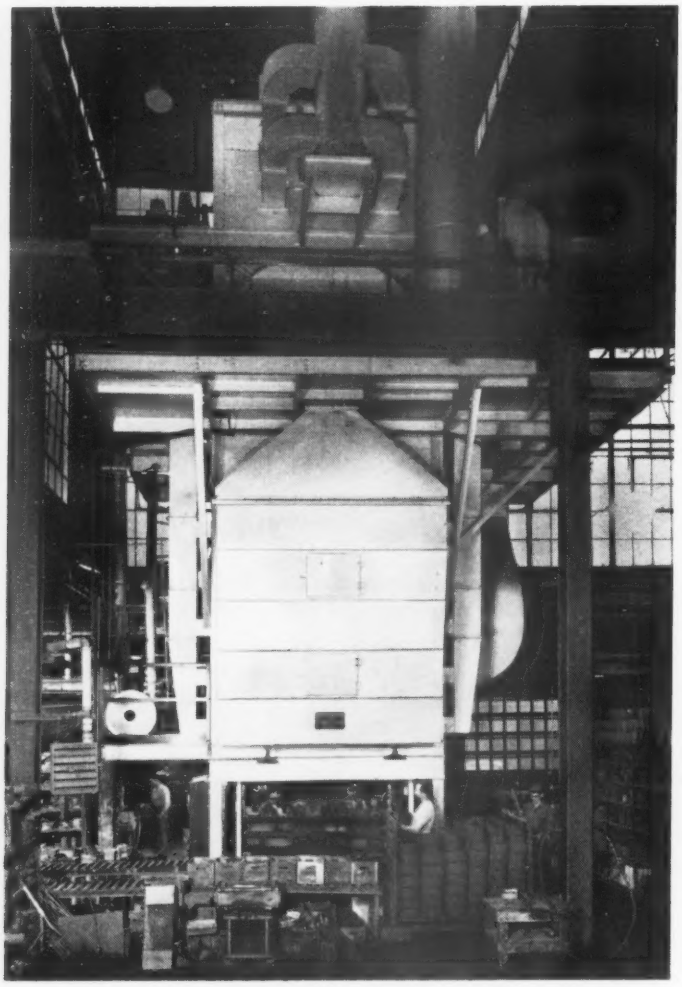
THE FREMONT FLASK COMPANY

FREMONT, OHIO

Write today for free literature and prices. All orders given prompt attention.

only COLEMAN

are made in a *Complete Range of Types* for the m



Coleman Tower® Oven

Are you aware of your core-room costs? Today, more than ever, fast dependable production of uniformly good cores and molds at the lowest over-all cost is vital to profitable foundry operation.

Even with the best of core boxes, machines, binder practice, and labor, your cores will be right only if they are properly baked. Avoid costly make-overs and rejects . . . do your core baking jobs faster and better with Coleman Core Ovens.

Coleman Mold Ovens insure proper drying to make castings true-to-pattern whether molds are to be skin dried or bone dried.

Coleman Engineers have pioneered and developed the most efficient oven designs to meet the highly specialized needs of modern foundry methods in all classes of work. Profit by this experience — get the unbiased facts on how modern Coleman Core and Mold ovens can substantially reduce your operating costs.

Let us recommend the RIGHT type of core or mold oven for your requirements—we make them ALL!

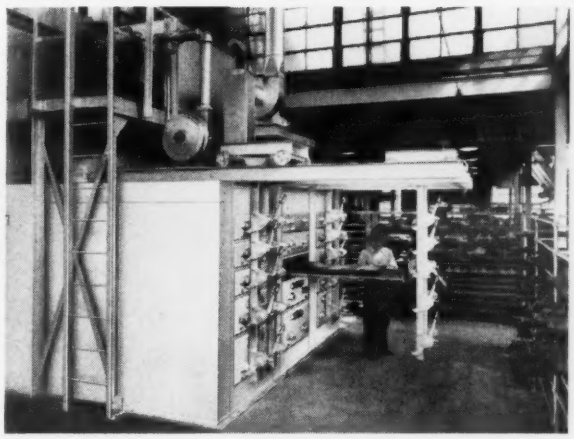
Write for Bulletin 54

MEMBER FEMA

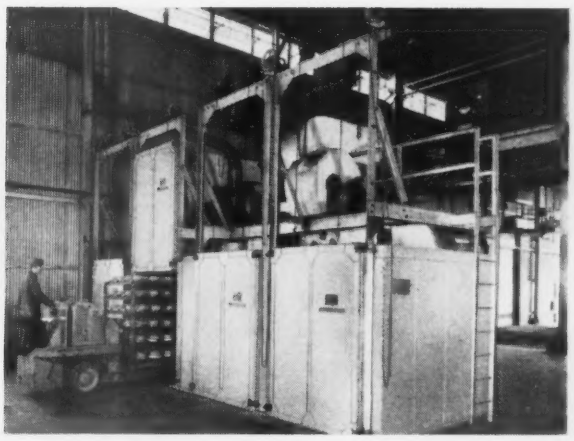
Coleman Tower Ovens	Coleman Portable Ovens	Coleman Continuous Redry Ovens
Coleman Dielectric Core Ovens	Coleman Heat Treat Ovens	Coleman Transrack Ovens
Coleman Car Type Core Ovens	Coleman Portable Mold Dryers	Coleman Horizontal Conveyor Ovens
Coleman Car Type Mold Ovens	Coleman Continuous Mold Ovens	Coleman Rolling Drawer Ovens

OVENS

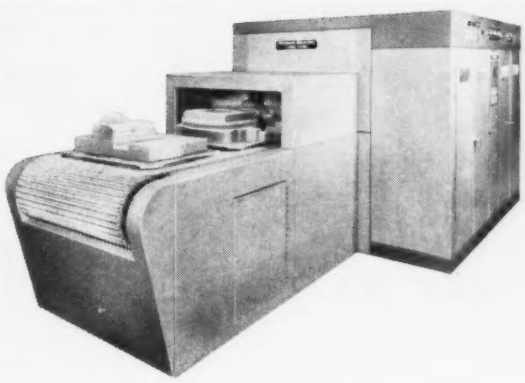
most economical production of cores and molds



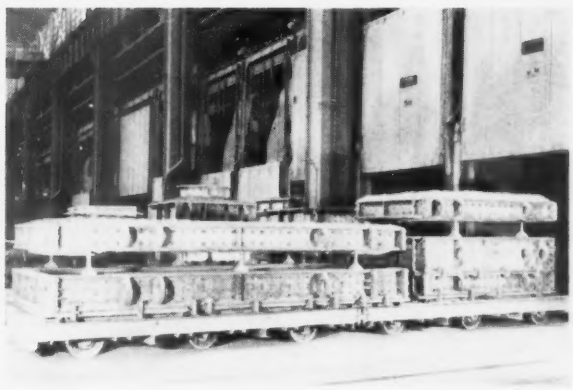
Coleman Rolling Drawer Core Ovens



Coleman Transrack Core Ovens



Coleman Dielectric Core Oven



Coleman Car Type Mold Ovens

Only COLEMAN offers a complete line of foundry ovens with all these advantages

RECIRCULATING HEATING OR DIELECTRIC SYSTEMS to meet your requirement best.

DEPENDABLE BAKING AND DRYING. Coleman Ovens remove all uncertainties in core baking and mold drying. Rejects and make-overs are eliminated.

INCREASED LABOR SAVING. Efficient and modern mechanical designs reduce handling and other indirect labor to a minimum.

HEAVY DUTY CONSTRUCTION. Responsible for dependable performance, economical operation, and minimum maintenance cost under rugged service requirements.

MAXIMUM FUEL ECONOMY. Coleman Heating Systems use the most economical fuel available to you—gas, oil, stoker-coal, electricity, etc.

FLEXIBILITY AND ACCURATE CONTROL to bake oil or resin binders—whichever is most satisfactory for your requirements.

BETTER WORKING CONDITIONS. Positive ventilation built into Coleman Ovens prevents leakage of fumes and gases—helps to make the core department a good place to work.

ADVANCED OVEN "KNOW-HOW". Coleman Engineers have pioneered and developed the most efficient oven designs to meet the highly specialized needs of modern foundry methods in all classes of work.

WIDEST EXPERIENCE. Gained through 50 years of specialization in foundry ovens and the building of more than 11,000 successful Coleman Oven installations.

THE FOUNDRY EQUIPMENT COMPANY

1821 Columbus Road • Cleveland 13, Ohio

WORLD'S ONLY COMPLETE LINE OF FOUNDRY OVENS

"They're darn good... for 3 REASONS"

SIZES:
10" or 13"
Squeeze Cylinder

TYPES:
Cantilever
Strain Bar
Column
(illustrated)

LONGER JARRING STROKE

Result: more intensive jarring effect

UNIFORM SQUEEZE

Better molds . . . and better castings
. . . leaves nothing to chance

RUGGED CONSTRUCTION

Tabor Jar Squeezers are built to last. Many machines in hard usage for ten, fifteen—yes, even twenty years.

Factory representatives in most principal cities. Write us for details and name of our representative nearest you.

FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION INC. MEMBER FEMA

The TABOR *Manufacturing Co.*

SINCE 1884 MANUFACTURERS OF FOUNDRY MOLDING MACHINES • OUR SEVENTIETH YEAR

6225 TACONY STREET • PHILADELPHIA 35, PENNA.

EXPORT DEPARTMENT, 1010 SCHAFF BLDG., PHILA. 2, PA.

can you match this Ability with any one machine?

Ability to dig The Allis-Chalmers HD-5G Tractor Shovel is not merely a loader. It is a powerful excavator. It can dig into clay, break up and load hard-packed bulk chemicals. Bucket teeth and rear-mounted hydraulic ripper attachments are available to speed tough excavating jobs.

Ability to load fast With its big 1¼-cu-yd bucket — and the power to crowd it full — the HD-5G keeps loading and stockpiling jobs moving at peak production. Two-yard light materials bucket is available for snow, coal, and other light materials.

Ability to maneuver—in close quarters. It takes a crawler tractor to utilize such power and capacity in such a small space. The HD-5G pivots around within its own track length. Special high-speed reverse adds further to output on short-cycle jobs.

Ability to handle any load A wide variety of front-end attachments may be quickly interchanged with the standard bucket. Included are Lift Fork for packaged and palletized loads, Bulldozer for stripping and stockpiling, Crane Hooks for machinery and other heavy, solid objects, special Rock Buckets and Rock Forks. Drawbar is always available for heavy hauling jobs.

Ability to work anywhere any time The HD-5G has stability to work safely over rutted or uneven ground . . . traction and flotation to travel through snow, mud, sand where rubber-tired equipment cannot operate. It is the ideal machine both for materials handling and yard maintenance jobs.

Write for literature or ask your Allis-Chalmers dealer to tell you more about the versatility and flexibility of the HD-5G. Let him show you how its ability to switch from job to job — and to do each one well —can save you time, labor and specialized equipment.

ALLIS-CHALMERS
TRACTOR DIVISION • MILWAUKEE 1, U. S. A.

YOU'LL DO A BETTER JOB

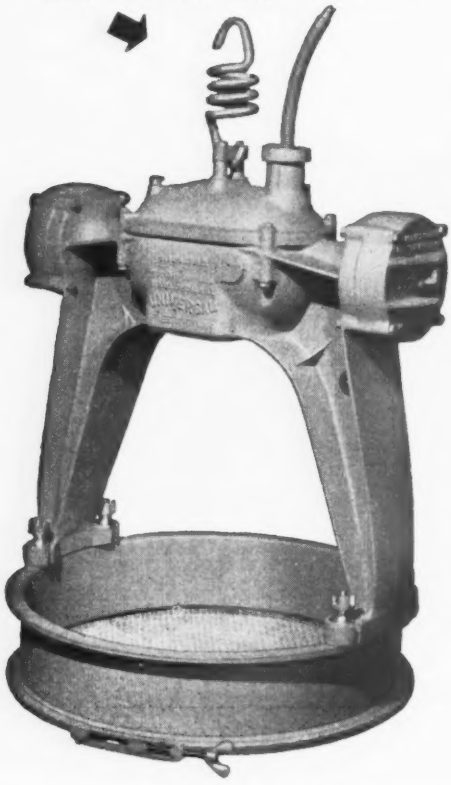
with **H. V. ADAMS DESIGNED**

HIGH EFFICIENCY FOUNDRY TOOLS

"UNIVERSAL FREE WHEELING"

FOUNDRY SAND RIDDLE

with the Double Eight Vibration

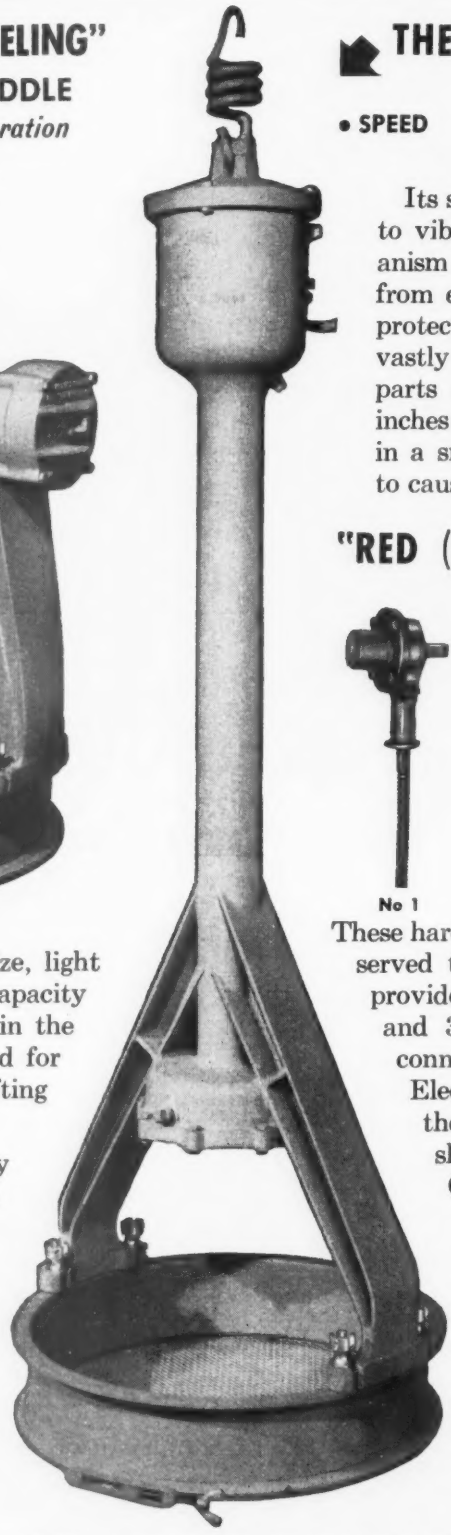


Because of its convenient size, light weight and good riddling capacity it long has been a favorite in the foundry. It also can be used for mixing core sand or for sifting sand directly into molds.

The mechanism is entirely enclosed protecting it from harmful dust and grit.

The main frame is cast in very strong tough aluminum.

It uses quick change ferruled sieves with 20 in. diameter sifting area. There are no loose wires to harm hands.



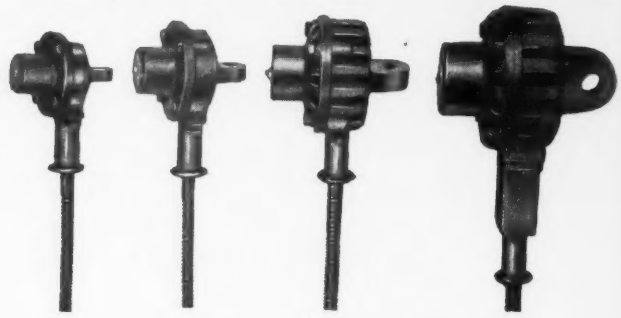
THE "ROTOPLANE" SPEED SIFTER

WILL GIVE YOU

• SPEED • ECONOMY • SAFETY • LONGER LIFE • GREATER SIFTING CAPACITY

Its sturdy one-piece frame and long shaft add to vibration effectiveness. The sealed-in mechanism assures protection of motor and bearings from exposure to dust and grit. This sealed in protection and "Rotoplane's" free-rotary action vastly increase bearing life. No exposed moving parts endanger the operator. Sieves have 20 inches diameter clear sifting area — are mounted in a smooth steel ferrule with no jagged edges to cause dangerous cuts and scratches.

"RED (Devil) ELECTRIC" VIBRATORS



No 1 **No. 2** **No. 5** **No. 9**

These hard hitting Adams designed Vibrators have served the foundries for over 30 years. They are provided with a 6 foot 3 wire authorized cable and 3 wire grounded connector which, when connected with our 3 wire grounded Red Electric Knee Switch, automatically grounds the vibrator protecting the worker from shock. The vibrators have passed the U. S. Government code inspection.

Other Foundry Products:

- **No. 11 NOISELESS TYPE VIBRATOR**
- **A-20 ELECTRIC VIBRATOR**
- **RED ELECTRIC KNEE SWITCHES**
- **"ROTO" ADJUSTABLE BIN VIBRATOR**
- **2 MIN. UNIVERSAL FINENESS TEST SIFTER.**
- **UNIVERSAL TRIPOD CARRIER**

ORDER ALL SIFTERS AND VIBRATORS WITH GROUND WIRE!!

FOUNDRY SUPPLIES MANUFACTURING CO., NOT INC.

2221 Orchard Street - Chicago 14, Illinois

Established 1918 **Cable Address: "Rotoplane Chicago"** **H. V. ADAMS, Mgr.**

telling the story of 'dag' dispersions

What Do *YOU* Want a Mold Wash to Do?...

. . . Prevent sticking? A **'dag'** colloidal graphite mold wash prevents sticking because it forms a micronically thin, exceptionally slippery *dry lubricating film*. It speeds parting and assures smooth castings.

. . . Go on easily? **'dag'** dispersions can be sprayed on, painted on, or applied by dipping. They are ideal for molds, patterns, chills, cores, push pins, shoulder screws, flask pins . . . even ladle interiors. Results: superior reproduction, elimination of binding and stripping, increased mold life, reduced inspection time.

. . . Work without smoking? Water dispersions of **'dag'** colloidal products improve shop conditions by eliminating irritating smoke caused by most parting compounds.

And if you want to avoid chilling, use a **'dag'** refractory mold wash.

Learn more about **'dag'** dispersions for foundry operations. Write *today* for Bulletin 425-J3.

Dispersions of molybdenum disulfide are available in various carriers.

We are also equipped to do custom dispersing of solids in a wide variety of vehicles.

dag DISPERSIONS

Acheson Colloids Company, Port Huron, Mich.

... also ACHESON COLLOIDS LIMITED, LONDON, ENGLAND

try 'dag' resin-bonded dry films for permanent lubrication

SITUATION UNDER CONTROL BY KEOKUK

CHIEF KEOKUK:
"Little Chief say old way get smoke signals crossed. He cut letters in blankets!"
PRINCESS WENATCHEE:
"As usual he has the situation well under control!"
dickstone

KEOKUK **K** ELECTRO-METAL COMPANY

KEOKUK, IOWA

WENATCHEE DIVISION, WENATCHEE, WASHINGTON

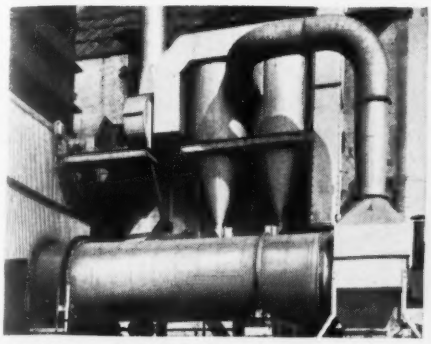
Keokuk Silvery . . . the superior form of silicon introduction for steel plants and foundries . . . available in 60 and 30 lb. pigs and 12½ lb. piglets . . . in regular or alloy analysis. Keokuk also manufactures high silicon metal.

Smoke out high costs and control quality with Keokuk Silvery Pig Iron! Keokuk assures less waste and exact control of the melt through uniform silicon distribution. Car for car, pig for pig, its uniformity *never* varies. Charge Keokuk by magnet or count.

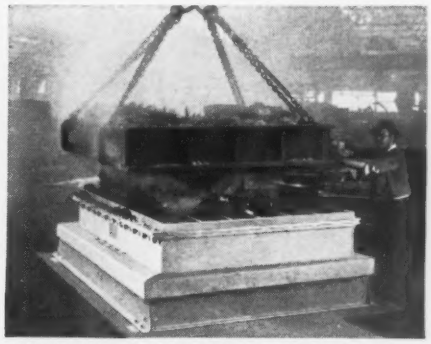
SALES AGENT: MILLER AND COMPANY

332 S. Michigan Ave., Chicago 4, Illinois
3504 Carew Tower, Cincinnati 2, Ohio
8230 Forsyth Blvd., St. Louis 24, Missouri

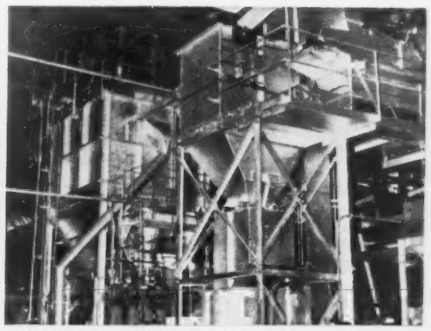
For handling sand and castings--



DRYERS — Link-Belt Roto-Louvre uniformly dries and cools large tonnages of sand. Floor space is conserved because no extra cooler is required.

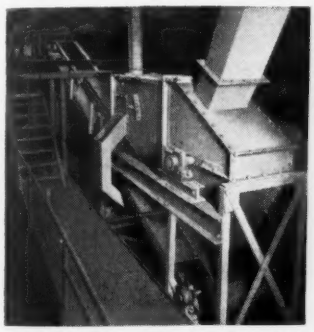


SHAKEOUTS AND SCREENS — Complete line provides centralized separation of sand and castings or sand screening for every type and size foundry.

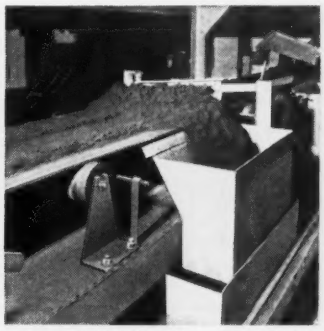


BUCKET ELEVATORS AND BINS — Low-cost elevating and storage of sand. Sturdily built in a wide range of types and sizes.

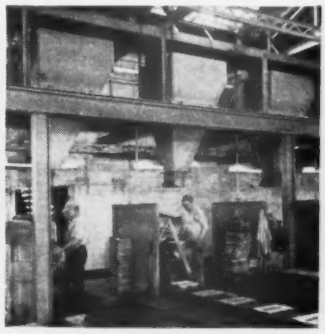
LINK-BELT quality equipment...



REVIVIFIERS — Thoroughly disintegrate, blend, cool molding sand so it will ram to uniform density. Also remove shot.



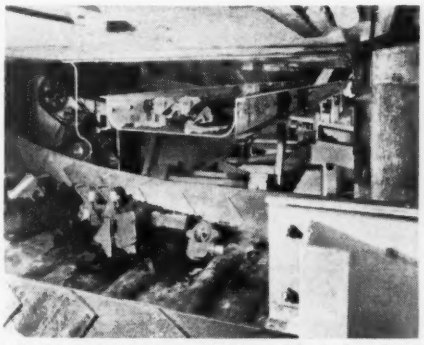
BELT CONVEYORS — Flat belt has plows to distribute sand to molders' hoppers. Troughed type used for other sand handling.



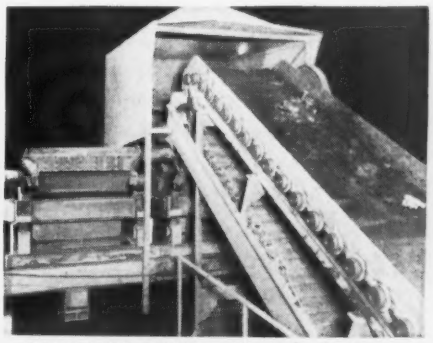
MOLDING HOPPERS — Built to avoid arching and allow free sand discharge with easy-operating duplex discharge gates.

MOLD CONVEYORS — A full line of car, pallet, roller and trolley types meets all variations of foundry practice.

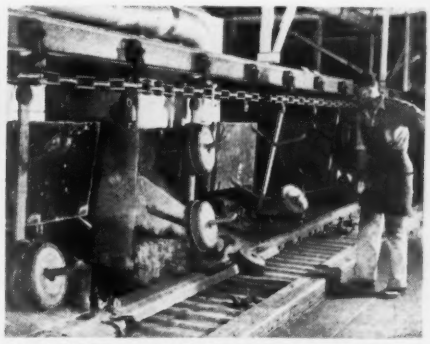
cuts your costs every step of the way



OSCILLATING CONVEYORS — Ideal for hot shakeout sand and castings. One-piece, all-metal trough eliminates wear, leakage. With screened trough section, acts as shakeout.

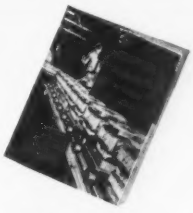


APRON CONVEYORS — No-leak design for long-life service on hot sand and castings. Operates in horizontal or steeply inclined paths. Also good as sorting conveyor.



OVERHEAD TROLLEY CONVEYORS — Cores, molds and castings are economically handled. Complete flexibility of path and capacity provided plus saving of floor space.

Ask your nearest Link-Belt office for new Book 2423. It shows Link-Belt's complete line of modern equipment for ferrous and non-ferrous foundries plus 7 tested layouts.

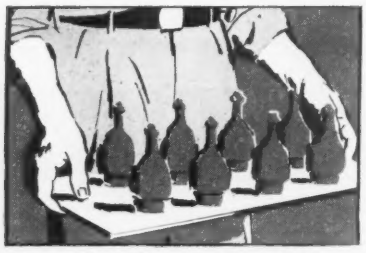


LINK-BELT

CONVEYORS AND PREPARATION MACHINERY

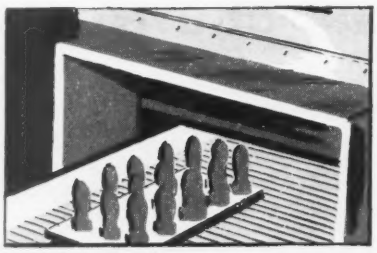
MEMBER FEMA

LINK-BELT COMPANY: Executive Offices, 307 N. Michigan Ave., Chicago 1. To Serve Industry There Are Link-Belt Plants and Sales Offices in All Principal Cities. Export Office, New York 7; Canada, Scarboro (Toronto 13); Australia, Marrickville, N.S.W.; South Africa, Springs. Representatives Throughout the World.



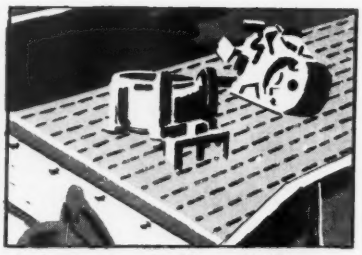
Superior Green Strength

Mogul imparts sag resistance and dimensional stability throughout handling and storage.



Quick Drying

All of our cereal binders and dextrines have this property, enabling you to increase oven capacity.



Adequate Collapsibility

These binders burn out at the desired moment, producing uniformly smooth draws.

A cereal binder for every bonding need

A complete line of foundry binders from the world's prime producer of corn products

THESE CEREAL BINDERS ARE PREFERRED FOR THEIR

- **CONSTANT AVAILABILITY**
- **SUPERIOR UNIFORMITY**
- **BROAD ADAPTABILITY**

Why you get greater green strength with MOGUL® Cereal Binder

Specially developed to meet today's needs for greater efficiency, Mogul Corn Cereal Binder is unique in the industry. Carefully controlled modern wet-milling processes produce a uniform product. Because of its bonding power in the wet state, Mogul Binder produces a core of great sag resistance and dimensional stability. Cores made with Mogul Binder produce castings with finer finish and exceedingly true pattern reproduction.

Why you get greater dry bond with KORDEK®

Kordek Core Binder renders complete binder coverage for foundry purposes. Kordek Core Binder develops a superior dry bond. Kordek is highly soluble, does not absorb core oil, and burns out completely, producing smooth draws. Kordek, a uniform product, is readily available in quantities to suit your needs.

Ask our technical service people how these superior cereal binders can help solve your casting problems. A special new foundry laboratory is ready to serve you. There is no charge or obligation for this service.

Why GLOBE® Dextrines regulate core hardness

The variety of solubilities available in Globe Dextrines enables you to achieve the degree of surface hardness you require. The controlled migrating properties of Globe Dextrines assures you of a smooth, hard surface when you want it and complete burn-out at the proper moment. Globe Brand Dextrines enable you to achieve exactly the collapse rate you desire, thus assuring you clean castings with close tolerances and a minimum of scrap.

GLOBE

CORN PRODUCTS REFINING COMPANY • 17 BATTERY PLACE, NEW YORK 4, N. Y.

"FOUNDROMATIC" SHAKEOUTS

enough weight to VIBRATE

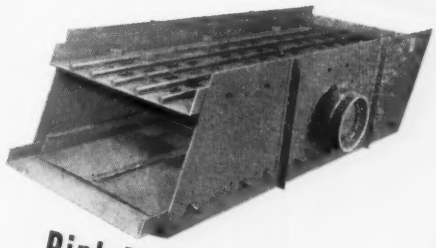
Underview shows why you get years of profitable service from a *Foundromatic* shakeout. The free-floating body includes lateral and longitudinal deck support members and sand hopper in a one-piece welded structure. Stress-relieving the entire unit after welding increases resistance to impact shock load.

The free-floating body of a *Foundromatic* shakeout — illustrated above — weighs more than 40% of shakeout capacity. You needn't worry about low weight ratio retarding shakeout operation with even the biggest castings. You don't have to buy extra capacity to get rapid shakeout.

Low maintenance is the result of its simple, rugged construction. For example, no mechanism shaft has ever broken during operation. Bearings are selected for extra-high service factor. Only one dust seal is needed because of the simple, two-bearing design. A specially designed pivoted motor base assures effective belt tension under all conditions of operation.

"Stopping bounce" has been eliminated too. The new exclusive* automatic snubber control brings the unit to a smooth, quiet stop. Mechanical snubbers — and their replacement — have been completely eliminated. Castings and flasks are not damaged by excessive throw.

*Patented



Ripl-Flo SCREENS

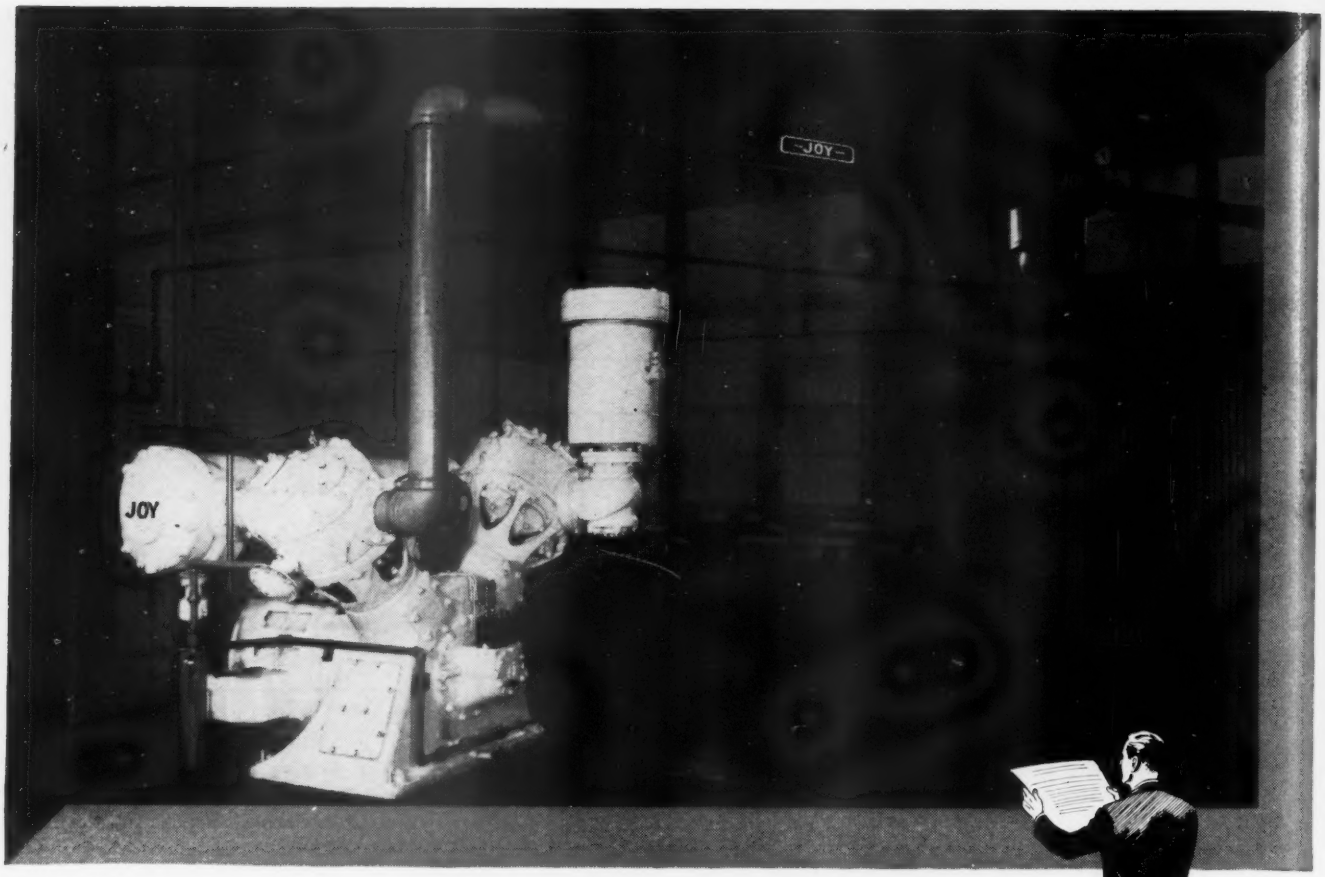
For breaking molding sand lumps — or other foundry screening jobs — you'll find *Ripl-Flo* screens save floor space and reduce maintenance because of their simple, two-bearing design. Write for Bulletin 07B6151.

You can get complete information from your nearby Allis-Chalmers district office. Or write Allis-Chalmers, Milwaukee 1, Wisconsin, for Bulletin 07B6365B.

A-4257

Foundromatic and *Ripl-Flo* are Allis-Chalmers trademarks.

ALLIS-CHALMERS



THE CONSULTING ENGINEER REPORTED:

"The Joy WN-112 is the quietest, best compressor in our experience"

This was the report of a group of consulting engineers who, working with the plant engineer, specify plant equipment for some of the country's most important air compressor installations.

That's all the engineers said, but they know Joy compressors are the "quietest and the best" because of these features:

- Honed, REPLACEABLE crosshead and cylinder liners.
- Exclusive "Dual Cushion" Valves—large area, low lift.
- Factory assembly and testing to insure permanent alignment.
- One-piece, box-type, tinned crossheads.
- Full force-feed lubrication.
- Precision crankpin and crosshead pin bearings.

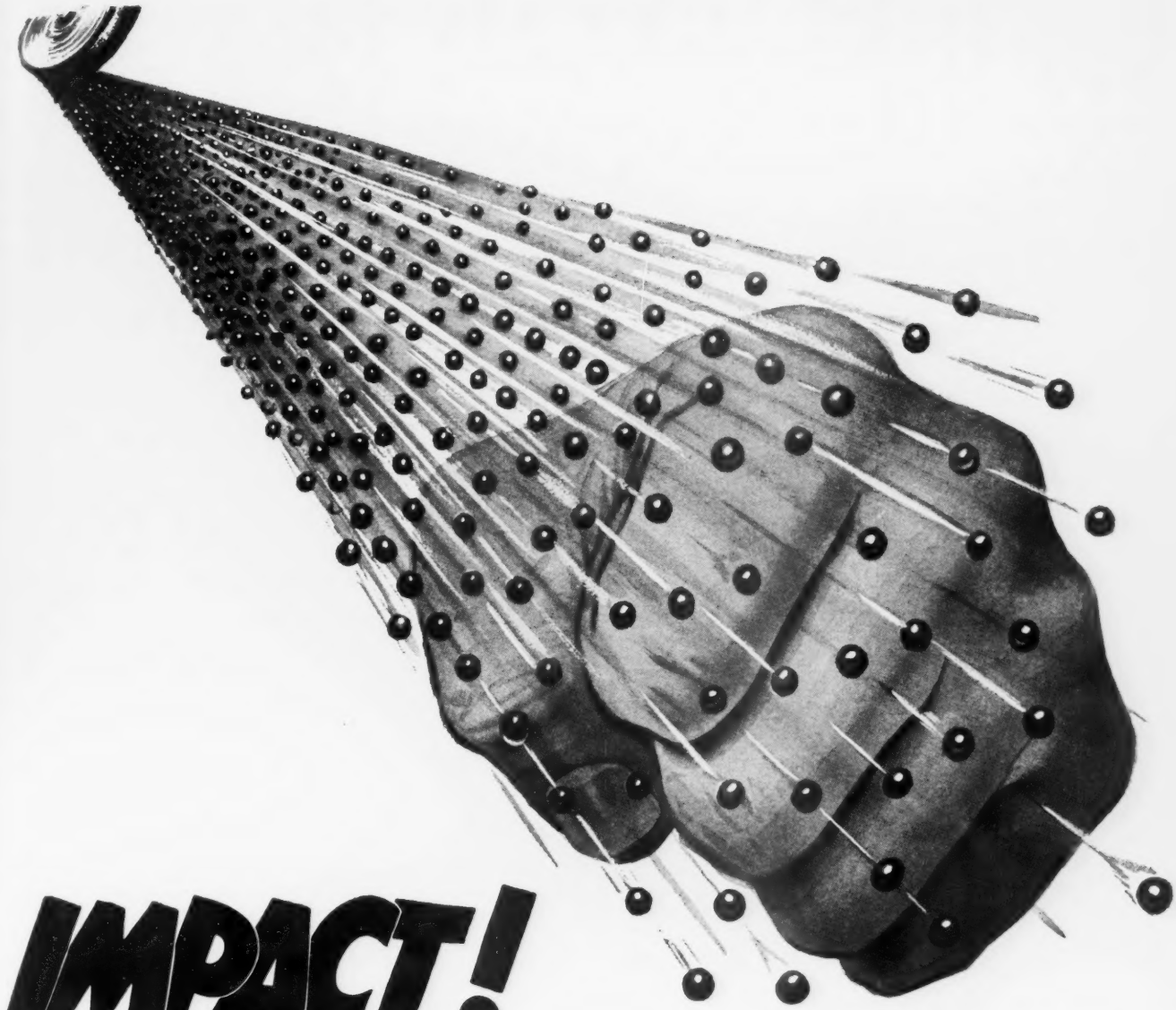
The Joy WN-112 is a heavy-duty, two-stage, double-acting, package-type compressor with displacement capacities from 368 to 974 CFM. Other single-stage, two-stage, and multi-stage Joy stationary air and gas compressors are available in capacities from 2 to 3896 CFM. and pressures from 30 to 600 psi. Write today for descriptive literature • ***Joy Manufacturing Company, Oliver Building, Pittsburgh 22, Pa.*** In Canada: *Joy Manufacturing Company (Canada) Limited, Galt, Ontario.*

Consult a Joy Engineer

WAD 1 5226

JOY

SPECIALISTS IN THE COMPRESSION AND MOVEMENT OF AIR AND GASES SINCE 1885



IMPACT!

MALLEABRASIVE . . . SHOT OR GRIT . . . is *packed* with blast cleaning power for profitable operation.

Because Malleabrasive is scientifically heat-treated and laboratory-controlled it does a *better, faster* cleaning job. And because it cleans quicker, lasts longer, saves you parts repairs and downtime—Malleabrasive means *cheaper cleaning.*

Words won't prove it—the final test is in *your* equipment. Try Malleabrasive on your jobs and see for yourself. Next time you order blast cleaning abrasive, specify Malleabrasive from PANGBORN CORP., 1400 Pangborn Blvd., Hagerstown, Md.

Pangborn DISTRIBUTORS FOR

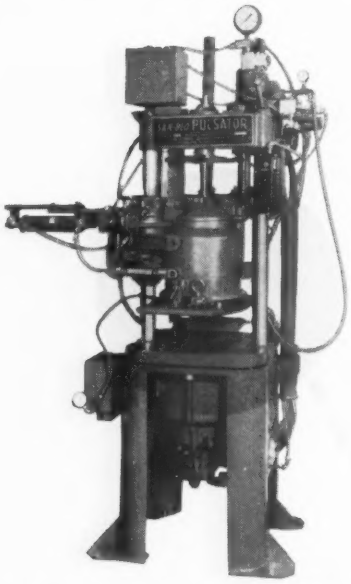
MALLEABRASIVE®

PANGBORN'S 50th ANNIVERSARY—1904-1954

*U. S. Patent #2184926
(other patents pending)

New Universal *Quick Change* Blow Plate...

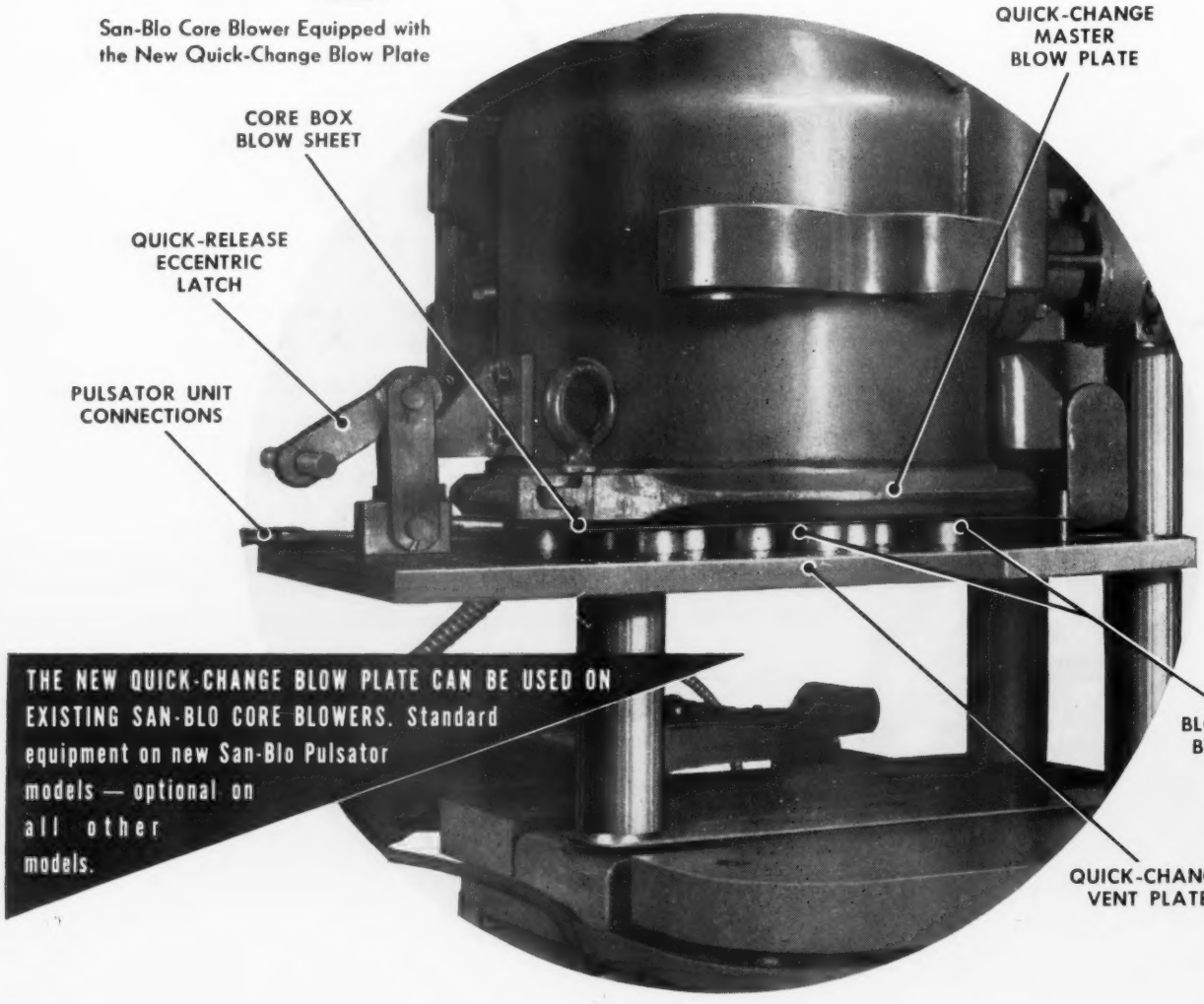
REDUCES CORE BOX RIGGING AND CHANGEOVER TIME TO A FEW MINUTES



San-Blo Core Blower Equipped with the New Quick-Change Blow Plate

Low quantity production of identical cores can now be blown on an efficient and economical basis with San-Blo and the New Universal Quick-Change Blow Plate.

- One Master Blow Plate blows all cores within machine capacity.
- Low cost Blow Sheets replace expensive blow plates required for each different type core.
- Less than 5 minutes required to make up a Blow Sheet and rig a core box for blowing different type cores. And, once a Blow Sheet is made and identified with its related core box, changeover time is slashed to a matter of seconds.

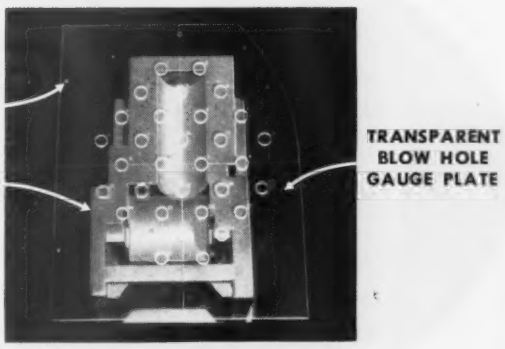


THE NEW QUICK-CHANGE BLOW PLATE CAN BE USED ON EXISTING SAN-BLO CORE BLOWERS. Standard equipment on new San-Blo Pulsator models — optional on all other models.

...for SAN-BLO Core Blowers

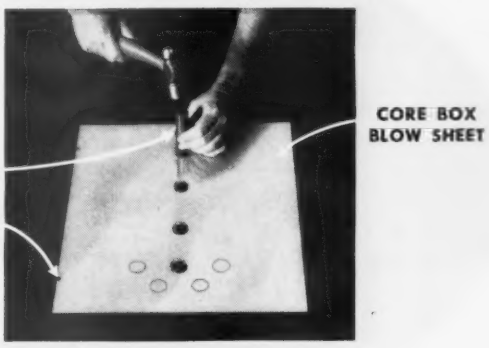
It's easy to make and use the *Quick Change* blow sheet---

STEP 1 **DETERMINE BLOW HOLE ARRANGEMENT.** Mark center lines on top surface of core box. Place Gauge Plate on core box aligning center lines of core box and Gauge Plate. Note stamped numbers identifying desired blow hole locations in Gauge Plate.



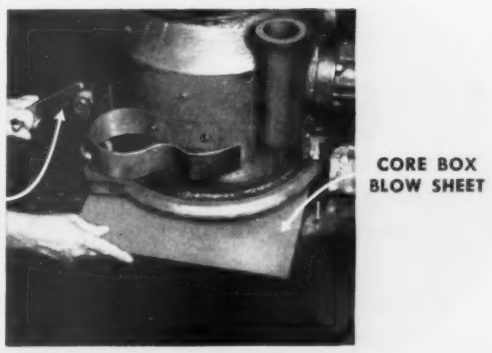
STEP 2 **PUNCH BLOW SHEET**

Place Gauge Plate on Blow Sheet, aligning Gauge Plate locating holes with notches in Blow Sheet, then mark blow hole locations noted in Step 1. Remove Gauge Plate and punch out blow holes in Blow Sheet.



STEP 3 **INSERT BLOW SHEET**

Unfasten eccentric latch and insert Blow Sheet between Master Blow Plate and Vent Plate. Secure latch and San-Blo is ready to blow the core.



For information on San-Blo and the New Quick-Change Blow Plate, write to the home office.

FEDERAL

FOUNDRY EQUIPMENT MEMBER FEMA MANUFACTURERS ASSOCIATION INC.

The **FEDERAL FOUNDRY SUPPLY** *Company*

4600 EAST 71st STREET, CLEVELAND 5, OHIO

CHATTANOOGA · CHICAGO · DETROIT · LOS ANGELES · MILWAUKEE · NEW YORK

EUROPEAN REPRESENTATIVE: SA. PH. BONVILLAIN & E. RONCERAY Rue Paul-Carle a Choisy-Le-Roi, Seine, France

FOUNDROMATIC *Dielectric* SAND CORE DRYER

"TELL-ALL" panel gives you four advantages

The *Foundromatic* dryer gives you all the advantages of dielectric drying plus the operational convenience and simplicity of "Tell-All" control.

1. Meters, lights, buttons are panel mounted at eye level, enabling operator to keep on top of operation at all times.

2. Electrode control permits adjusting to the physical variances of cores.

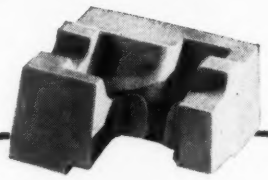
3. Electrical overloading is prevented by the belt-loading control. Conveyor stops when load is too great.

4. Automatic grid control assures correct drive to oscillator tube regardless of oven load.

Advantages of Dielectric Drying Over Oven Drying

Drying time measured in minutes — smoother core finishes — superior shakeout characteristics — clean, cool core rooms — elimination of core storage — 60% fuel savings — all these advantages are yours with dielectric drying.

Compare features and operating records of the various dielectric dryers available. You will discover, because it is easier to operate, the *Foundromatic* dryer augments and multiplies the inherent advantages of the dielectric method.



Six minutes is all it takes to dry this core in a *Foundromatic* dryer. The job would take 70 minutes in a conventional oven.

Get all the facts on dielectric core drying — call your nearby Allis-Chalmers district office or write Allis-Chalmers, Milwaukee 1, Wisconsin. Ask for Bulletin 15B7306B.

A-4450

Foundromatic is an Allis-Chalmers trademark.

ALLIS-CHALMERS

New lightweight grinder is a HEAVYWEIGHT WORKER!

Why weigh down an operator with a heavier grinder? Put a new 7 pound air-powered CP Vertical Grinder in his hands and he'll remove the same amount of metal as he formerly did with a 10 pound tool!

Designed for driving cup wire brushes and grinding wheels, sanding discs, and cut-off wheels, the CP-3190 is tops for its handling ease and versatility. The features below explain why the CP-3190 takes the constant beating of heavy industrial usage with minimum maintenance:

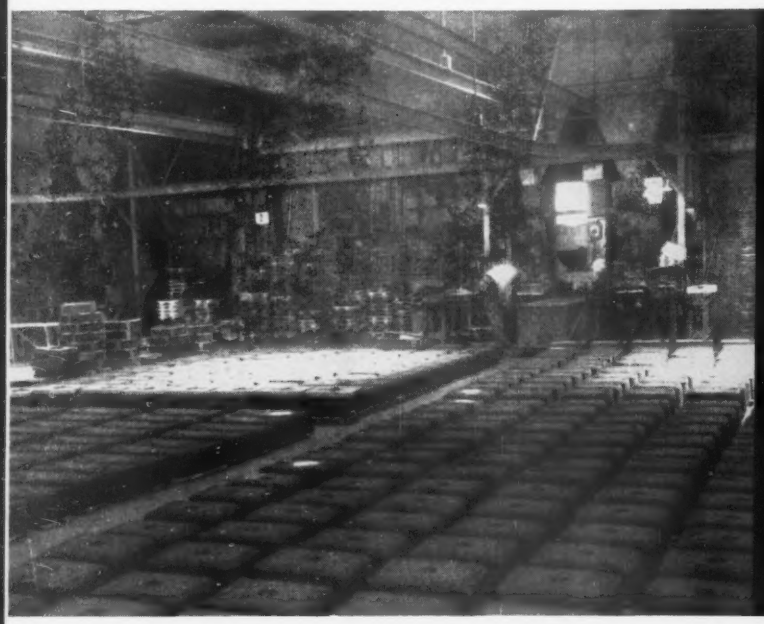
- **Splined type floating rotor to prevent end-plate wear from wheel thrust.**
- **Continuous lubrication is afforded by large oil reservoir and built-in lubricator.**
- **Safety governor valve cuts off air supply in the event of possible governor failure.**

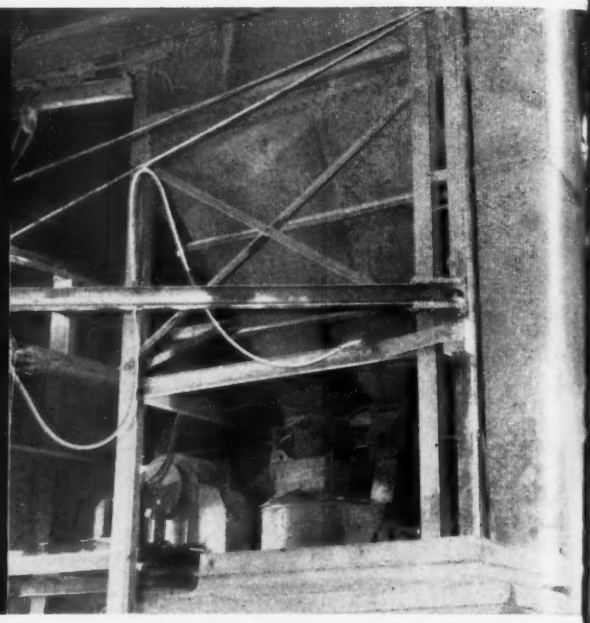
Available in speeds up to 8000 RPM and in capacities capable of handling 6" cup wheels, and 7" and 9" disc sanding pads and cut-off wheels. For more information write *Chicago Pneumatic Tool Company, 8 East 44th Street, New York 17, N. Y.*

Chicago Pneumatic

PNEUMATIC TOOLS • AIR COMPRESSORS • ELECTRIC TOOLS • DIESEL ENGINES • ROCK DRILLS • HYDRAULIC TOOLS • VACUUM PUMPS • AVIATION ACCESSORIES

NEWAYGO helps increase castin





Otaco, Ltd. The twin Handy Sandy units in their second year of operation "replaced 12 individual mold-making machines, yet give the same output—a ratio of 3 to 1 increase in efficiency. One twin Handy Sandy unit concentrates on molds for nodular iron castings, while the other unit handles mostly molds for grey iron castings." Sand is loaded into storage bins behind the Handy Sandy units by a Payloader. Portable roller conveyors are used for speedy transference of molds to the floor area. Photo shows a portion of the molds obtained in one day's run. Otaco, Ltd. is getting from 300 to 450 molds per day from each man.

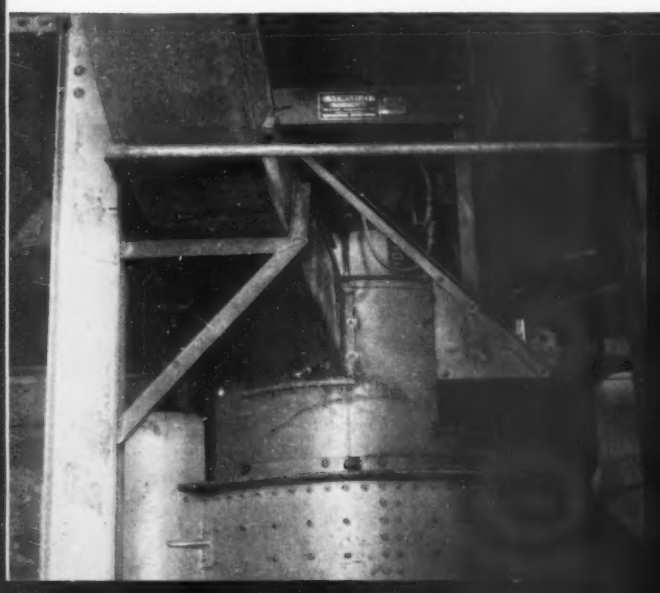
Canadian Electric Castings, Ltd. Here are shown the vibrating shake-out, elevator and double sand storage bin which are part of a complete Newaygo Sand Handling and Conditioning Unit. One part of the two-compartment storage bin is for used sand, and the other part is for new sand. The used sand is charged into a mullor through an air operated gate. The new sand is measured into a mullor through a Newaygo operated Rotary Vane Feeder. The sand, after being properly mixed in the mullor, is delivered to molding stations.

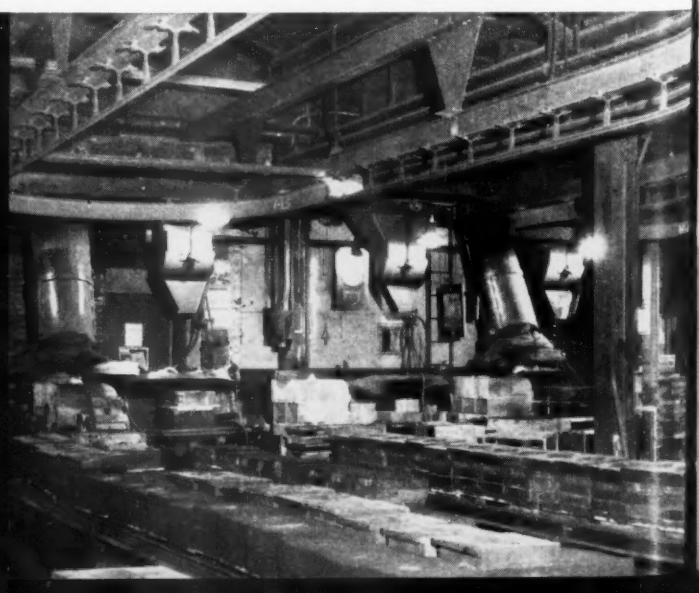
3 out of 5 foundries in Orillia, Ontario use Newaygo Sand Handling equipment

Fahralloy Canada, Ltd. These two photographs show the installation of component parts of the Newaygo Sand Handling and Conditioning equipment in the foundry of Fahralloy Canada, Ltd.

The photograph on the left shows the Newaygo Traveling Weighlarry, which is an important part of the overhead sand system since it provides accurately weighed batches of sand to the mullor.

The photograph at the right shows the five overhead Newaygo Molding sand hoppers which operate with airgates, also designed and fabricated by Newaygo as part of the overhead system.





stings' production in CANADA

NEWAYGO ALSO SERVES THESE FOUNDRIES IN THE HEART OF INDUSTRIAL CANADA:

ALBERTA	
Crane Limited	1 Handy Sandy, 1 Reddy Sandy
Foothills Steel Fdry. & Iron Works, Ltd.	1 Handy Sandy
BRITISH COLUMBIA	
Major Aluminum Products, Ltd.	1 Reddy Sandy
MANITOBA	
Manitoba Steel Foundries, Ltd.	1 Handy Sandy
Monarch Machinery Co., Ltd.	1 Handy Sandy
QUEBEC	
The Robert Mitchell Co., Ltd.	2 Handy Sandys
Volcano, Ltd.	1 Reddy Sandy

ONTARIO	
Algoma Steel Corp., Ltd.	2 Handy Sandys
Beatty Bros., Ltd. (Fergus)	1 Handy Sandy
Beatty Bros., Ltd. (Penetanguishene)	2 Handy Sandys
Burndy Canada, Ltd.	1 Handy Sandy
Canadian Brass Co., Ltd.	1 Handy Sandy, 1 Reddy Sandy
J. F. Cunningham & Son, Ltd.	1 Handy Sandy
Ontario Malleable Iron Co., Ltd.	4 Handy Sandys
Prescott Brass Mfg. Co., Ltd.	1 Handy Sandy, 1 Reddy Sandy
A. H. Tallman Bronze Co., Ltd.	1 Handy Sandy
J. A. Wotherspoon & Son, Ltd.	1 Super Handy Sandy

THE FOLLOWING HAVE INSTALLED OR ARE IN THE PROCESS OF INSTALLING NEWAYGO SAND HANDLING EQUIPMENT:

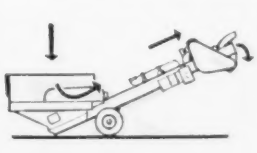
ALBERTA
Riverside Iron & Engineering Works, Ltd.

ONTARIO
Canada Iron Foundries, Ltd.
Port Hope Sanitary Mfg. Co., Ltd.
Neptune Meters, Ltd.
Ford Motor Co. of Canada, Ltd.

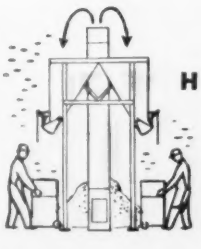
Reports from foundries with installations of Newaygo equipment show an average increased production of 59.6%, the lowest being 20% and the highest 300%. Man hours saved average 44%, the lowest being 13% and the highest 80%. Free engineering layouts, service and estimates by practical engineers—single contract efficiency with one company responsible for fabrication, installation, erection and final inspection—a complete staff of service engineers on 24-hour call—plus a 40-year record of proved ability in the foundry field—all these factors assure production increases and man-hour savings that will pay for mechanization, and step up profits.

HANDY SANDY
puts sand overhead, eliminating shoveling for the molder.

REDDY SANDY



takes the hard work out of shakeout and sand preparation.



SUPER HANDY SANDY
a high capacity individual-floor sand handling unit.

A copy of "Planned Mechanization for Foundries" is yours for the asking. Write, wire, or phone today.

NEWAYGO ENGINEERING COMPANY

Manufacturers of Neway® Mold Handling, Sand Handling and Conditioning Equipment

Don Barnes Foundry Supplies & Equipment • Hamilton, Ontario
605 James St., North Phone Jackson 7-7436

Canadian representative for Provinces of Manitoba and Ontario, east to Kingston.

Takes the "cramp" out of cramped quarters

Turns 10" shorter circle . . . moves up to 25% faster

Rear steering wheels of the Jaeger 12 cu. ft. Auto-Scoop make shortest turn . . . in only 6'6" radius with bucket in carry position (5" shorter than other scoop loaders). That's a big advantage when unloading box cars, working in narrow aisles or cramped quarters. When you figure how often those fewer inches avoid extra maneuvering in tight spots, you can see how this feature alone saves productive minutes every hour.

With this increased maneuverability, the Auto-Scoop shortens time on every trip. It travels up to 25% faster, both forward and reverse. Two speeds forward and two reverse offer speed selection to suit each condition of service. The simple shift of an independent forward-reverse lever provides split-second changes in travel direction.

3½" greater overall width (4'8") improves stability and balance, yet keeps the Auto-Scoop within the confines of limited aisle space. 6¾" ground clearance also exceeds that of other scoop loaders.

These are only a few of the advantages of the Load-Plus Auto-Scoop, the material handler designed specifically for most efficient scoop loader operation. Production gains can also be realized from its greater power (33 hp @ 1800 rpm), bigger lifting capacity (1200 lbs.), higher dumping clearance (4'6" under lip, 6'8" under hinge), longer reach (2'7"), lower bucket tilt-back, lower carry, other features.* Write for Catalog L12-4 and name of nearest distributor.

(*Comparative performance based on well-known scoop loaders now in the field).

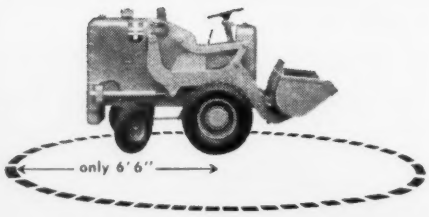
For bigger work, Jaeger offers the 1 cu. yd. Load-Plus, with torque converter, power steering and either front-wheel or 4-wheel drive.

The Jaeger Machine Company, 502 Dublin Avenue, Columbus 16, Ohio

JAEGER LOAD-PLUS *auto-scoop*

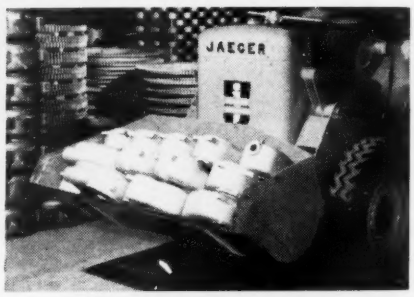
AIR COMPRESSORS • PUMPS • MIXERS • PAVING MACHINES

Distributors throughout U.S. and Canada and Principal Cities of the World

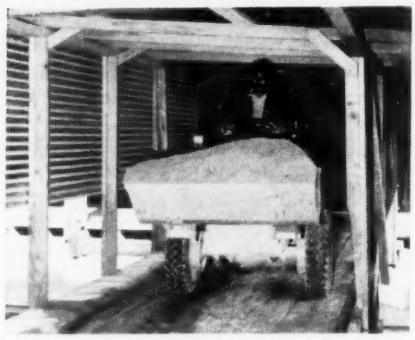


5" shorter turning radius (only 6'6").

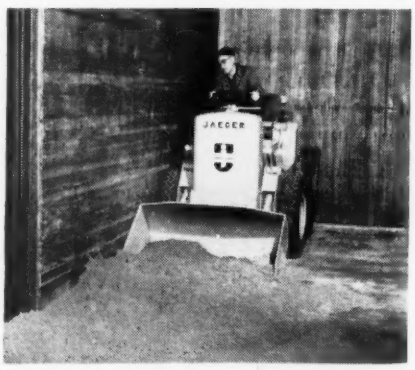
Faster speeds (6.55 and 13.88 mph in reverse, 3.8 and 7.66 mph forward).



20% more lifting capacity (1200 lbs.).

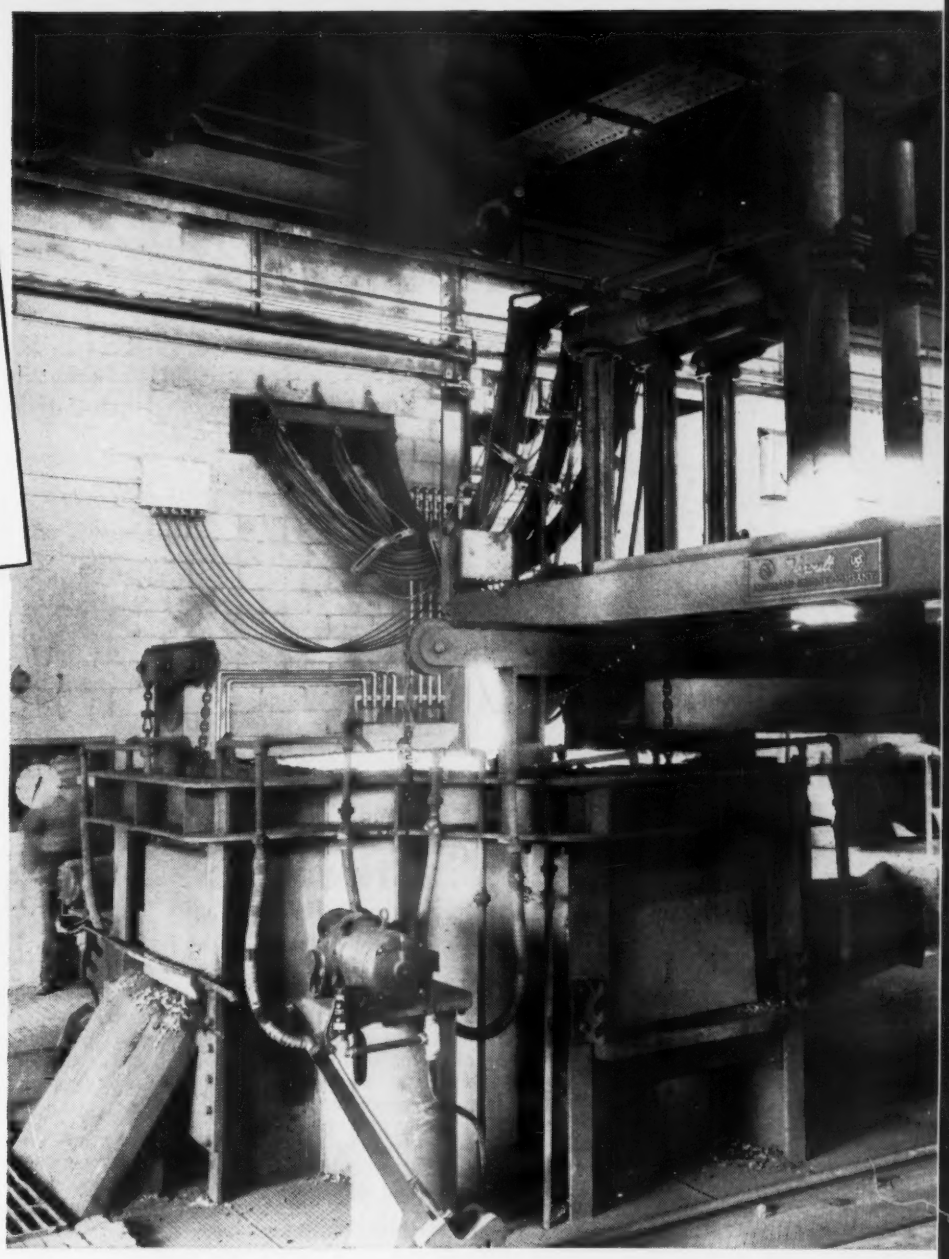


Compact design. Simplifies work where aisles are narrow, headroom low.



Wider bucket. Works flush against walls, into corners, for clean pick-up.

Heroult
ELECTRIC MELTING FURNACES



The high production capacity of the Heroult makes it the foundryman's favorite furnace!

NEW CATALOGUE
Now Ready

Contains up-to-date information on Heroult Electric Melting Furnaces — types, sizes, capacities, ratings, etc. For free copy, write to our Pittsburgh office.

AVAILABLE in foundry sizes with either Gantry or swing-type roof, these widely used furnaces are equipped with the latest time- and labor-saving mechanical devices and electrical controls. They are noted for their efficient performance, low operating and maintenance costs.

We welcome an opportunity to help you select and install the foundry furnace best suited to your requirements.

AMERICAN BRIDGE DIVISION, UNITED STATES STEEL CORPORATION
GENERAL OFFICES: 525 WILLIAM PENN PLACE, PITTSBURGH, PA.

Contracting Offices in New York, Philadelphia, Chicago, San Francisco and other principal cities.
United States Steel Export Company, New York

USS

UNITED STATES STEEL

Foundries Grow and Prosper In the *Birmingham* District

FOUNDRY PRODUCTION in the central Birmingham district—America's No. 3 foundry area—has mounted steadily and rapidly since World War II. This is due to an unusual combination of manufacturing and distributing advantages, including:

Typical grey iron castings, ranging from 2 to 30 pounds.

Fast growing Southern markets—availability of high and low phosphorus pig iron—skilled, cooperative native-born workers—abundant supply of the world's finest foundry coke—natural and by-product gas and cheap electricity—good moulding sand—superior transportation facilities—favorable freight rates.

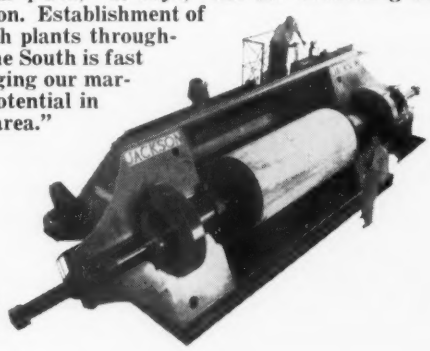
Typical is the Case of Birmingham's JACKSON INDUSTRIES, Inc.

Jackson Industries started as a small enterprise, which made only cast iron culvert pipe and veneer machinery. Today it manufactures for the automotive, home appliance, air conditioning and agricultural implement industries the widest range of production type grey iron castings of any foundry south of the Ohio River. The favorable location of Birmingham enables Jackson Industries to deliver castings in New York, Michigan, Pennsylvania, Ohio, Illinois and other markets.

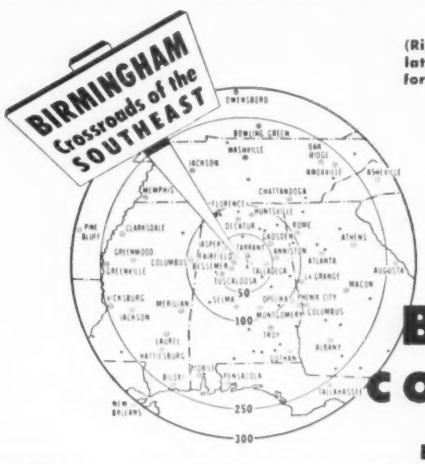
The Company's Veneer Machines Division has likewise expanded and diversified greatly. In addition to the manufacture of veneer lathes from the smallest to the largest size, this division designs and builds special precision machinery for steel mills and other industries throughout the U. S. A. and in many foreign countries.

Important factors in the Company's success have been competent, cooperative labor and availability of raw materials in the Birmingham district, according to R. L. Jackson, executive vice-president.

"Our plans," he says, "call for continuing expansion. Establishment of branch plants throughout the South is fast enlarging our market potential in this area."



(Right) A 68,000-pound lathe to produce veneer for the plywood industry.



★ ★ ★ ★ ★ ★ ★ ★

Industries interested in cutting costs and building sales volume are invited to send representatives to Birmingham and investigate present opportunities. This Committee will give them a cordial welcome.

BIRMINGHAM COMMITTEE OF 100

1914 Sixth Ave., N., Birmingham, Ala.

Executive Committee

Gordon Persons
Governor of Alabama

John S. Coleman
President
Birmingham Trust National Bank

Donald Comer
Chairman Exec. Comm.
Avondale Mills

R. Hugh Daniel
President
Daniel Construction Co.

William P. Engel
Engel Companies

W. W. French, Jr.
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Moore-Handley Hdw. Co.

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Tenn. Coal & Iron Div.
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Joseph N. Greene
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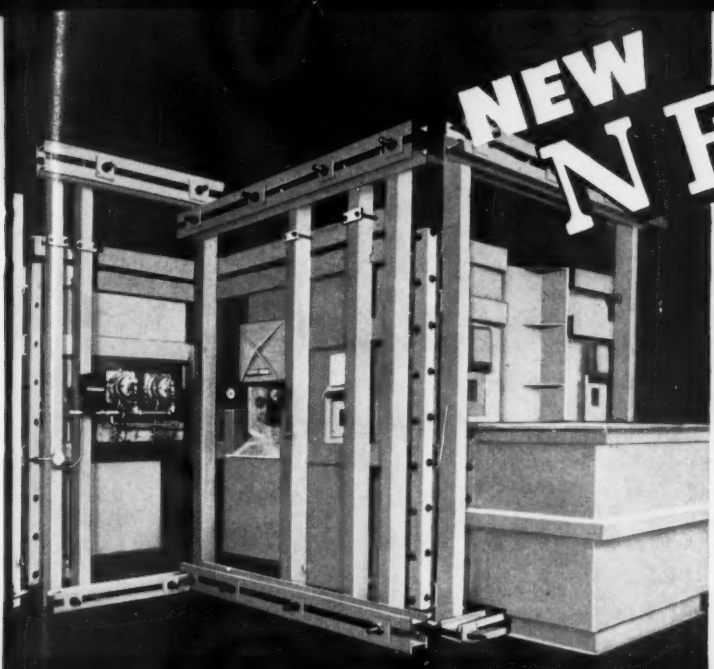
United States Steel Co.



Made for 120,000 lbs. Zinc

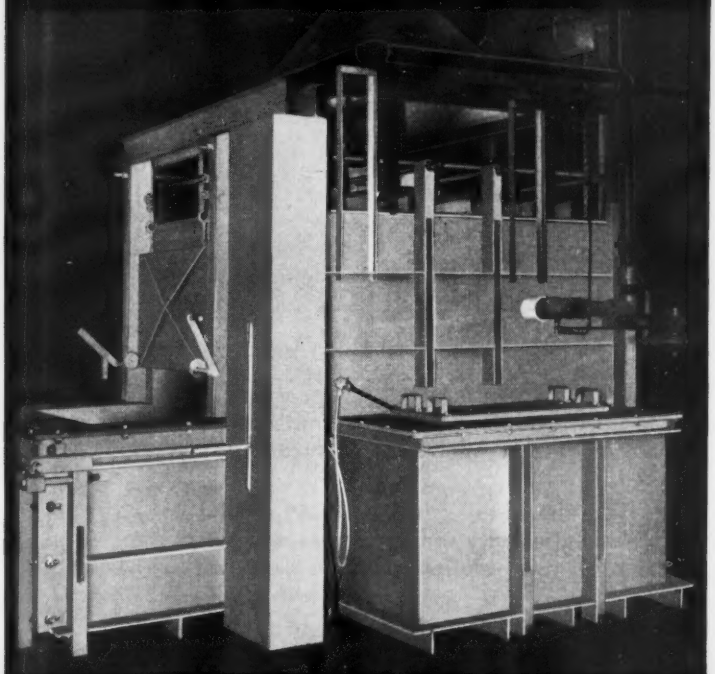
NEW NEW NEW!

STROMAN NOW OFFERS A COMPLETE LINE OF REVERBERATORY FURNACES FOR THE MELTING OF . . .

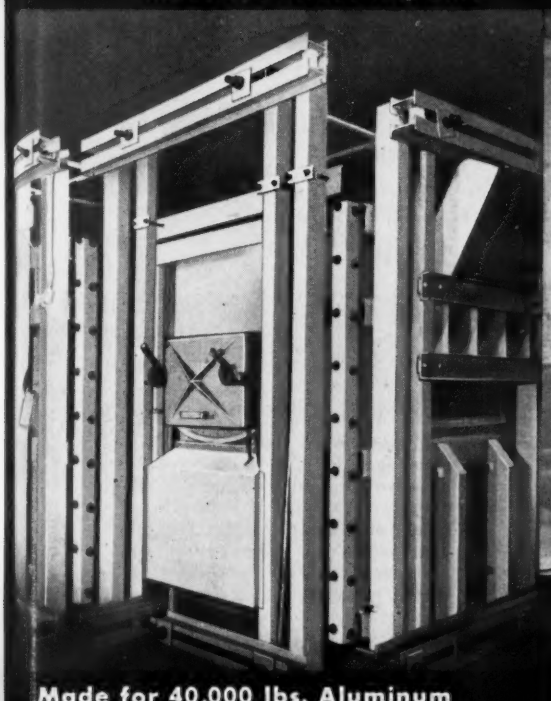
ALUMINUM, ZINC, BRASS

Capacities are unlimited

These reverbs are built to assure heavy duty production for Smelting, Extrusion work, Die Casting, Permanent Molding and Foundry melting. Now in operation in some of the most prominent plants in the country they have proved their ability to deliver great volumes of metal that results in perfect castings, every time. They are easy to work with and around . . . operate most economically and are easy to maintain. Their efficiency and economy will amaze you and convince you of their superiority to any other furnace available. Why not write to-day for full information.



Made for 16,000 lbs. Zinc



Made for 40,000 lbs. Aluminum

Made for 25,000 lbs. Aluminum

STROMAN FURNACE & ENGINEERING CO.

DIVISION OF

THE PETERSEN OVEN CO., FRANKLIN PARK, ILL.

...let's take a look at the 3F SIMPSON *MIX-MULLER* from the OPERATOR'S viewpoint

▶ *Put yourself on the mixer operator's platform* . . . and take a good look at the big-capacity 3F Simpson Mix-Muller from *his* viewpoint. He's interested in producing *big batches of uniformly high quality sand with a minimum of operating and maintenance attention.*

. . . And that's just what he gets with the 3F Simpson Mix-Muller. Specifically, here are some of the reasons why operators prefer Simpsons:

Easy access for adjustments and safe, routine maintenance . . . Vertical and radial plow adjustment easily made without entering mixer. Removable crib section permits all rotating machinery to be disassembled without disturbing foundation or overhead structures . . . and parts are removed in units without exposing gears or bearings.

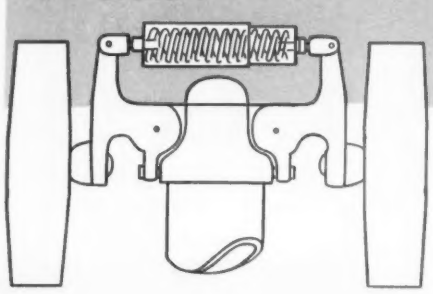
Safe, positive lubrication . . . Mullers and turret are grease-packed at the factory, and equipped with both labyrinth and friction type seals. Simple, dependable alemite centralized lubrication system serves mullers, rocker arm and turret—easily accessible from outside of mixer. Reducer is self-contained, splash lubricated.

Efficient utilization of power . . . Weight of the sand is carried on the bedplate, and discharge is handled by gravity through bottom doors—the only power required is that used to travel mullers over the sand and repile it in the muller path.

Most thorough mulling action ever developed . . . The comparatively lighter, *adjustable* mullers greatly increase the over-all efficiency of the mulling action, as the pressure can be adapted to the type of sand to be conditioned—and the 3F design permits handling at least 1/3 more capacity than previous models.

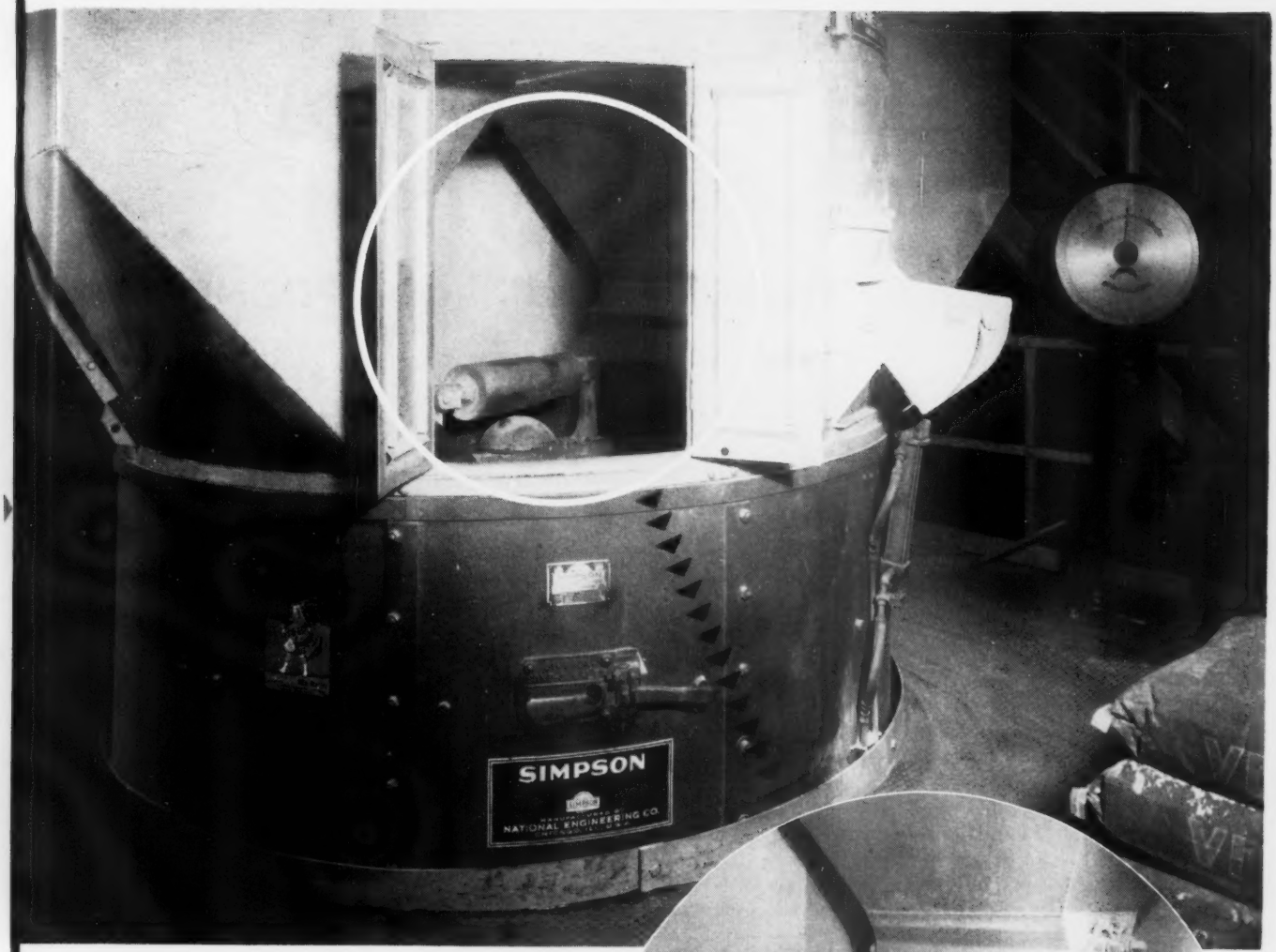
▶ Now, having examined the 3F Simpson Mix-Muller from the operator's platform, we think you can more readily see why these efficient units will give you greater tonnages of properly prepared sand . . . at lower operating and maintenance costs . . . and with fewer rejects, less scrap loss, and over-all improvement in casting quality.

Let our engineers prove what these high production Mix-Mullers can do for you . . . Write for BULLETIN 511.



Advantages of SPRING-LOADED MULLERS . . .

◀▶ The spring loading arrangement of the mullers in the 3F Mix-Muller permits infinitely variable loading from 1,600 to 4,000 lbs. In the beginning of the mixing cycle the sand has little green strength and demands a light mulling weight. As the strength of the sand increases, the mullers rise and in turn exert a higher pressure on the deep sand bed beneath them. Because of the muller suspension and the plow design, the sand is subjected to much more violent agitation, and is considerably increased in volume. The agglomerate grains are broken up, any tendency to form "muller cake" is reduced, and a fluffy sand of high flowability results.



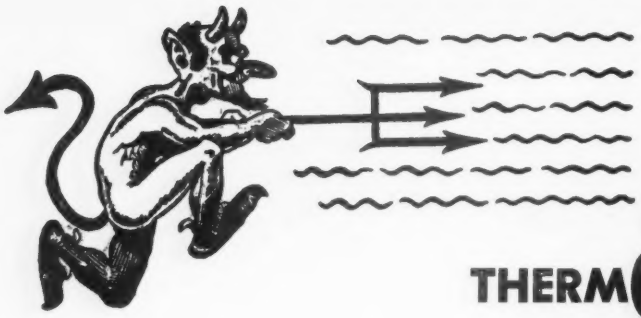
Here's the way the operator views the 3F Simpson Mix-Muller—in this case, at a large malleable foundry, where this high capacity unit is equipped with air-operated bond hopper and dust hood, charged from overhead batch hopper. The close-up view shows the streamline, dirt-tight design of the turret, spring-loaded mullers and rocker arm assembly, and part of the centralized lubrication system lines.

SIMPSON *Intensive* **MIX-MULLERS**

National Engineering Company

646 Machinery Hall Bldg. • Chicago 6, Illinois

Manufacturers and Selling Agents: For Continental European Countries—George Fisher, Ltd., Schaffhausen, Switzerland; for British Possessions—August's Limited, Halifax, England; for Canada—Dominion Engineering Co., Ltd., Montreal; for Australia and New Zealand — Gibson, Battle & Co., Pty., Ltd., Sydney, for Argentina, Brazil and Uruguay — Equipamentos Industriais EISA Ltda., Sao Paulo, Brazil; for Mexico—CASCO ,S. De R.L., Mexico, D.F.



Soffel's

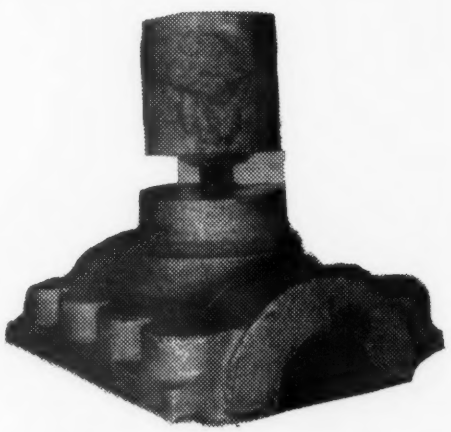
THERMOTOMIC® COMPOUNDS and CARBON FREE LIQUIDIZERS

Keeps metal molten!

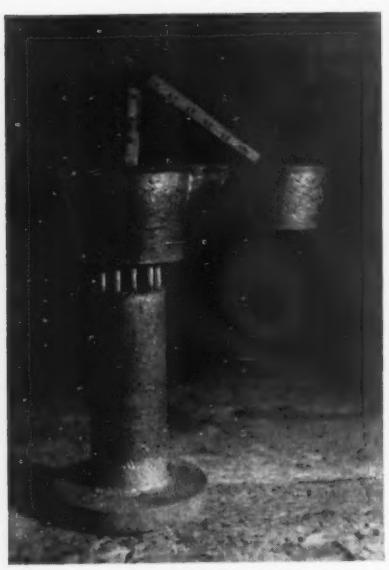
. . . for Steel, Iron, Aluminum, Brass, Bronze, Copper

THERMOTOMIC "X" is a patented exothermic compound that produces a temperature over 3500° F. It can be molded or baked into any desired shape the same as sand cores. THERMOTOMIC "X" is used as knock off core rings with 1½ inch feeder opening under risers of feeding heads, also as insulating sleeves, inserts and facings, or mixed with facing sand where it is desired to maintain fluidity of the casting metal. Shorter and more compact heads and risers can be used. The small feeder opening permits easy removal of feeding heads and risers. In conjunction with THERMOTOMIC COMPOUNDS, we recommend the use of exothermic CARBON FREE LIQUIDIZER NO. 5 on top of the metal in the heads or risers as an insulating cover. For green sand casting molds, use THERMOTOMIC WP (Waterproof).

U. S. Patents No. 2,490,327 and No. 2,500,097



300 lb. aluminum bronze bearing cap cast with THERMOTOMIC feeding ring core under riser. Note small feeder opening which facilitates removal of riser from casting, resulting in greatly reduced cleaning costs.

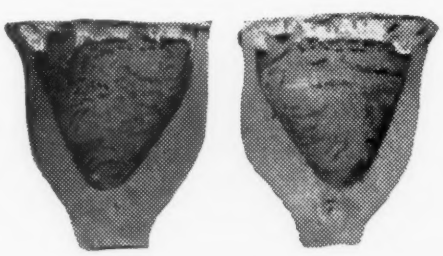


THERMOTONIC STRAINER CORE

Produces Monel Castings 270 ibs. solid

Made by direct pouring through the Thermotomic strainer core under the feeding head.

No chills were used, no shrinkage at the flange. Note depth of shrinkage in the feeding head.



NOTE THESE TYPICAL RESULTS FROM THE USE OF SOFFEL'S CARBON FREE LIQUIDIZER

With the application of 1 pound of SOFFEL'S CARBON FREE LIQUIDIZER, this 6″ x 6″ chrome-nickel-steel riser was reduced in weight from 32 pounds to 13 pounds average. A savings of 19 pounds of salable metal, normally discarded as scrap, was fed into the casting and produced a heavier, sounder casting. Note the feeding head can be knocked off easily, saving burning costs. There is no better feeding head compound at any price than SOFFEL'S CARBON FREE LIQUIDIZER.

BEWARE OF IMITATIONS! We are the originators of CARBON FREE LIQUIDIZER and THERMOTOMIC COMPOUNDS

Pittsburgh Metals Purifying Company

WORLD'S LARGEST MANUFACTURERS OF FLUXES AND PURIFIERS FOR ALL METALS AND ALLOYS

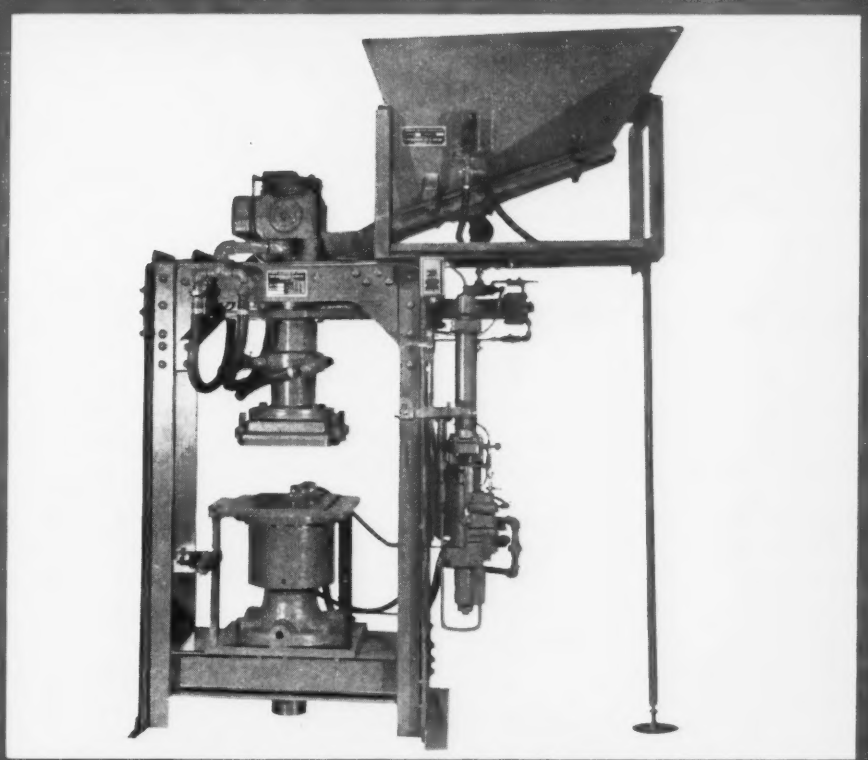
1352 MARVISTA ST., N.S. **PITTSBURGH 12, PA.**

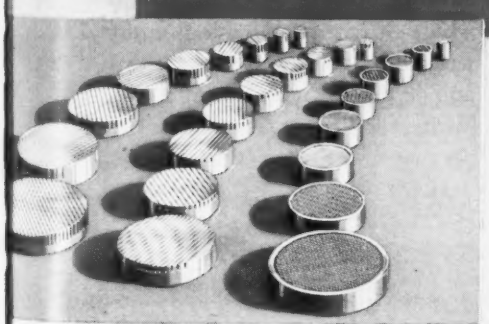
Our Sales Story is Simp

Demmler

Core Blowers hold the record for BOTH:

1. *Highest Production*
2. *Lowest Maintenance*





Demmler is the best source, too, for precision core box vents. Brass slotted, steel slotted and screen types for every application, including the new D-process.

For core blowers, remember this: You cannot buy faster production, lower maintenance than Demmler's. The reasons are 1. Demmler-simplified design with all parts easily accessible, and 2. More rugged Demmler construction. The Demmler 1E-OS, shown above with sand feeder, is typical. Just push starting lever for automatic, double production. Used with two drag halves, the operator never has to wait.

Write for literat

SANDCUTTER'S *whirling blades help beat the cost spiral*

Never A Mirage* On This Desert of Sand

**For 46 years—in thousands of foundries SANDCUTTER has been the low-cost method of getting a quality-conditioned sand.*

Quality and economy are no illusory mirage on the deserts of sand on foundry molding floors across the nation where the whirling blades of a Sandcutter are providing profitable sand conditioning.

Sandcutter conditioned sand is infinitely better than that cut by hand. It riddles fast, rams easily and vents perfectly. Sand such as this is bound to result in a better, more uniform casting and reduce scrap losses to a minimum!

With a Sandcutter on the job you can be sure of lower unit costs, too, through savings all along the line; fewer man-hours for sand conditioning, less time required for grinding, cleaning and inspection, less labor turnover and increased production.

Since 1908 more than 1500 Sandcutters have been installed in jobbing and production shops of every type. As an investment in profitable sand conditioning they are hard to beat. They pay dividends for many years—many are still in operation today that are 20 and 25 years old—and they are still going strong.

Save manpower — step up the whole efficiency of your foundry with a Sandcutter. There's a size and type to meet your needs. Write for literature today.

Write today for catalog No. 25-A describing the Sandcutter for cutting average size floors.

American SANDCUTTER®
WHEELABRATOR & EQUIPMENT CORP.
505 S. Byrkit St. Mishawaka, Ind.

Dear Reader:

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• For further information on helpful literature, trade publications, and new equipment descriptions, please refer to IDEAS FOR FOUNDRYMEN insert and return cards on page 247.

FOUNDRY Readers Service

FIRST CLASS
Permit No. 36
(Sec. 34.9 P.L.&R.)
Cleveland, Ohio

BUSINESS REPLY CARD
No Postage Stamp Necessary if Mailed in the United States

4c POSTAGE WILL BE PAID BY—

FOUNDRY
Penton Building
Cleveland 13, Ohio

Readers Service Dept.

SEPTEMBER 1954

IFC	36-37	71	100	179	217	256R	280	294R3
1	38	72	129	180	218	257L	281	294R
2	39	73	131	181	220-1	257R	282	295TL
4-5	40-41	74-75	133	183	223	258L	283	295BL
6-7	42	76	135	184	224	258R	284L	295R
8	43	77	137	185	225	259T	284R	296L
9	44	78	138	187	226-7	259B	285	296R1
10	45	79	140-1	188	228	261	286T	296R2
11	46	80	143	189	229	262T	286R	296R3
12	47	81	147	190	230-1	262B	287R	297T
13	48	82	149	191	233	263	288L	297BL
14	49	83	150	192	234	264T	288TR	297BR
15	50	84	153	193	235	264R	288BR	298T
16-17	51	85	154	195	236	265L	290T	298L2
18	52-53	86	156-7	196	239	265R	290BL	298R2
19	54	87	159	196-9	240L	267	290BR	298L3
20	55	88	161	201	240R	269	291TL	298R3
21	56-57	89	162	203	241	270T	291BL	298B
22-23	58	90	163	204	243	270B	291R	299TL
24	59	91	164	205	246	271	292L	299BL
25	60	92	166-7	206	249	272	292TR	299R
26	61	93	168	207	250L	274L	292BR	300TL
27	62-63	94	169	209	250R	274R	293T	300BL
28-29	64	95	170	211	251T	275	293BL	300R2
30	65	96	171	212	251B	277	293BR	311
31	66	97	172	213	253	278T	294T	312
32	67	98	174	214	255	278B	294-2	IBC
35	70	99	176-7	215	256T	279	294L3	OBC

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COMPANY _____

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CITY & STATE _____

This card MUST be completely filled out. Please TYPE or PRINT

SEPTEMBER 1954

IFC	36-37	71	100	179	217	256B	280	294B3
1	38	72	129	180	218	257L	281	294R
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6-7	42	76	135	184	224	258R	284L	295R
8	43	77	137	186	225	259T	284R	296L
9	44	78	138	187	227-7	259B	285	296R1
10	45	79	141-1	188	228	261	286T	296R2
11	46	80	143	189	229	262T	286B	296R3
12	47	81	147	190	230-1	262B	287R	297T
13	48	82	149	191	233	263	288L	297BL
14	49	83	150	192	234	264T	288TR	297BR
15	50	84	153	193	235	264B	288BR	298T
16-17	51	85	154	195	236	265L	290T	298L2
16	52-53	86	156-7	196	239	265R	290BL	298R2
19	54	87	159	198-9	240L	267	290BR	298L3
20	55	88	161	201	240R	269	291TL	298R3
21	56-57	89	162	200	241	270T	291BL	298B
22-23	58	90	163	204	243	270B	291R	299TL
24	59	91	164	205	246	271	292L	299BL
25	60	92	166-7	206	249	272	292TR	299R
26	61	93	168	207	250L	274L	292BR	300TL
27	62-63	94	169	209	250R	274R	293T	300BL
28-29	64	95	170	211	251T	275	293BL	300R2
30	65	96	171	212	251B	277	293BR	311
31	66	97	172	213	253	278T	294T	312
32	69	98	174	214	255	278B	294-2	IBC
35	70	99	176-7	215	256T	279	29413	OBC

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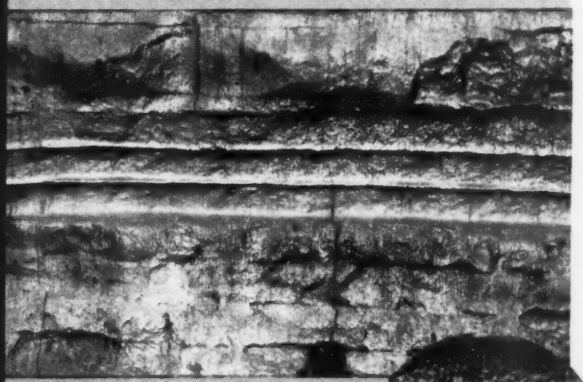
FOUNDRY Readers Service

AFTER 16 HEATS...SATANITE JOINTS PROTRUDE BEYOND THE FIREBRICK SIDEWALLS

EMPIRE firebrick sidewall of malleable air furnace laid up with A. P. Green SATANITE. Note the thin brick-to-brick joints.



Same sidewall after 16 heats. Close-up section of wall shows the protrusion of SATANITE joints after firebrick had worn back several inches.

SATANITE JOINTS PROVIDE LONGER RUNS, INCREASED PRODUCTION, LOWER REFRACTORY COSTS

A large midwestern foundry reports excellent results from furnaces in which A. P. Green SATANITE slag resisting mortar was used in laying up the sidewalls. The above photographs clearly tell the story. A sidewall is shown immediately following installation and after 16 heats.

Note that after 16 heats, although the firebrick attacked by flame, slag and molten metal, has worn back several inches, the SATANITE joints still protrude ⅛ to ¼ inch beyond the surface. This enables the wall to wear back evenly and give added joint protection. Protection that pays off in lower refractory cost, longer runs and increased production.

In malleable air furnaces where sidewalls and bottom are laid up with SATANITE, any part of them can be easily removed for patching or rebuilding. Use SATANITE bonding mortar to increase the life of the lining in all types of malleable iron air furnaces, ladles, electric furnaces, cupolas, and hot metal mixers. Packed in 100-pound multi-wall bags.

Look for the name of your nearby A. P. Green Distributor in the yellow pages of your telephone directory or write us for further information.

A. P. GREEN FIRE BRICK COMPANY
Mexico, Missouri, U. S. A.
IN CANADA
A. P. GREEN FIRE BRICK COMPANY, LTD.
Toronto 15, Ontario

A. P. Green
REFRACTORY PRODUCTS

DISTRIBUTORS IN THE PRINCIPAL CITIES OF THE WORLD

WALSH GRAFLOK PLASTIC WORKS WONDERS IN YOUR LADLE LININGS

"LOK"ing out the destructive affects of metal oxides and slags for greatly increased service life is the feat performed by Walsh Graflok Plastic Ladle Lining.

ADVANTAGES:

Easier Flow of Metal • Reduces Wear on Lining • Graphite Lubricating Effect Cuts Slag Adherence—Makes Removal Easier • Slashes Refractory Cost Per Ton of Metal Melted

USES:

- **Receiving and Mixing Ladles**
- **Bull Ladles, Hand Ladles—All Types of Foundry Ladles**
- **Spouts of Cupolas and Malleable Iron Furnaces**
- **Tap Holes, Slag Holes and Cupola Wells**
- **Nozzle Wells of Bottom Pour Ladles**
- **Hot Metal Troughs and Runners**
- **Lining of Cupola Front Slagging Spouts**

Walsh also makes—Graflok Ladle Coating. In dry form, in 100 lb. waterproofed bags, ready for immediate use by the addition of water.

Packed in 100 lb. waterproofed cartons—ready for use—sliced for ease in handling and in dry form for operators preferring plastic consistency for their particular needs. Packed in 100 lb. water proofed bags, for mixing with water on job.

WRITE FOR FREE GRAFLOK BULLETIN

WALSH REFRACTORIES CORPORATION

101 FERRY STREET • ST. LOUIS 7, MISSOURI

FOR OVER 50 YEARS MANUFACTURERS OF HIGH GRADE REFRACTORIES

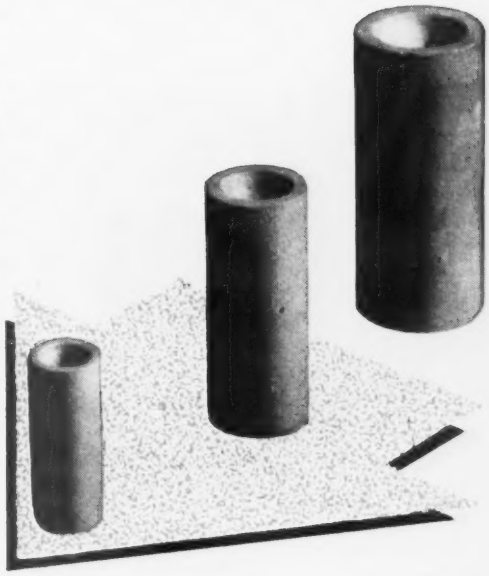
Leading Foundries Use...

NORBIDE® Nozzles

Because . . .

- They get more service per dollar cost (750 hours silica sand — 1500 hours steel shot or grit). NORTON guarantees this minimum service.
- Their air consumption is reduced from 10 to 20 per cent as compared with iron nozzles.
- They maintain stream contour and abrasive velocity.

For full details on cost-cutting NORBIDE Nozzles, write for your free copy of Form 543.



NORBIDE®... *the longest nozzle life you can buy*

NORTON
BORON CARBIDE

NORTON COMPANY

43 New Bond Street • Worcester 6, Mass.

Making better products . . . to make other products better

MELTRITE

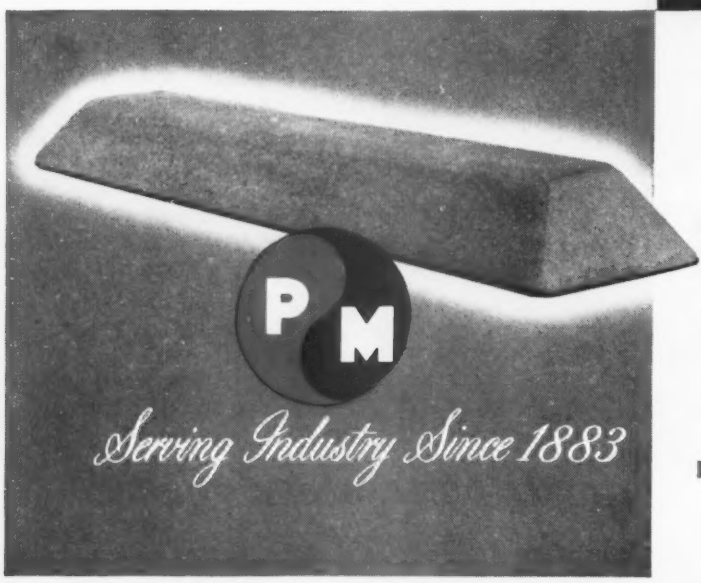
PIG IRON

Increased Productive Capacity

To Meet The Needs of Industrial America

MORE USED THAN ANY OTHER MERCHANT PIG IRON

This is the new and larger Federal "A" furnace in the Chicago district—62% increase in capacity over the old furnace. Productive capacity has been increased also at both Toledo and Erie.



Foundry Service Department
Available Without Obligation

PICKANDS MATHER & COMPANY

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Grand Rapids • Greensboro • Indianapolis • Minneapolis
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IRON ORE • PIG IRON • COAL • COKE

NEW BAKER "Yardloader"
TRADE-MARK

4000 LB. GAS FORK TRUCK COSTS ONLY $2985.00

Priced about 25% under any other gas trucks in its capacity, the Yardloader now brings cost-saving fork truck operation within the reach of practically every company with yard-handling problems. Travel speed approaching 14 miles per hour, large pneumatic tires, exceptionally high ground clearance and oscillating trail axle make it the ideal truck for outdoor service over large unimproved or semi-improved areas.

Heavy-duty industrial engine of proven make, 4-speed transmission and extra-heavy drive axle assure ample power for top performance under any conditions. Hydraulic lift to 122 inches, automotive-type steer, convenient controls and excellent driver visibility are a few of the features contributing to safety and ease of operation.

Get all the facts—and save up to $1000.00 on your next gas fork truck.

Send in this coupon today.

THE BAKER-RAULANG COMPANY

1223 West 80th Street • Cleveland 2, Ohio

The Baker-Lull Corporation • Subsidiary, Minneapolis, Minn.
Materials Handling and Construction Equipment

TO THE BAKER-RAULANG CO., 1223 West 80th St., Cleveland 2, Ohio

Please send me information and specifications on the new Baker EY-40 Yardloader which sells for only $2985.00.

Name_____ Title_____

Company_____

Address_____

City_____ State_____

Fast, Safe S

TRAMRAIL

A heavy centrifugal dryer casting being inspected by General Superintendent H. T. Hendricks and Heavy Floor Foreman L. L. Boone. This piece weighs 3620 lbs. Castings weighing from two oz. to 5300 lbs. are produced at McNally Pittsburgh.

McNally Pittsburg Foundries, Inc.

FOUNDERS OF PROCESS & ALLOY CAST IRON

Pittsburg, Kansas

Engineering Division
THE CLEVELAND CRANE & ENGINEERING CO.
Wickliffe
Ohio

Gentlemen:

We have your query about our present Cleveland Tramrail system. As you know, Tramrail was selected to service our three machine molding floors and the core department when this Foundry was built in 1945. Electric hoists are used.

The requirements were unusual. The machine floors handle a wide variety of work, calling for two to three types of metal during the day. Furthermore, the metal is scheduled on a semi-continuous basis, split into two separate heats. In addition, heavy flasks must be delivered to pouring conveyors and poured flasks must be delivered to the shakeout while the pouring cycle is proceeding.

This requires maximum flexibility in serving the floors with flasks, cores and metal; which was the determining factor in selecting Tramrail.

In our opinion, the experience over the past years has amply proven the success of your original recommendations. We feel that Tramrail is the most efficient and economical system for handling such a diversity of service demands.

Cordially,

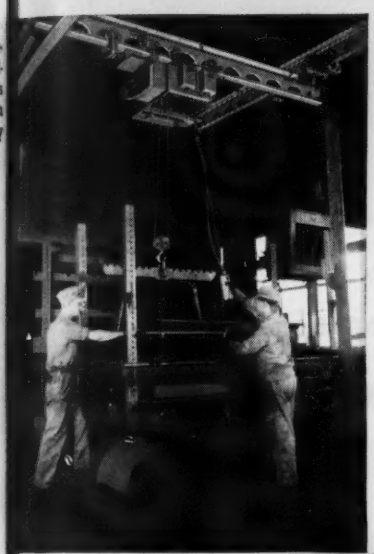
H. T. Hendricks
Superintendent

HTHendricks
trc

GENERAL OFFICES & FOUNDRY, PITTSBURG, KANSAS SUBSIDIARY OF THE McNALLY PITTSBURG MFG. CORP. PITTSBURG, KANSAS
SALES OFFICES: CHICAGO, ILLINOIS, PITTSBURGH, PENNSYLVANIA, WELLSTON, OHIO

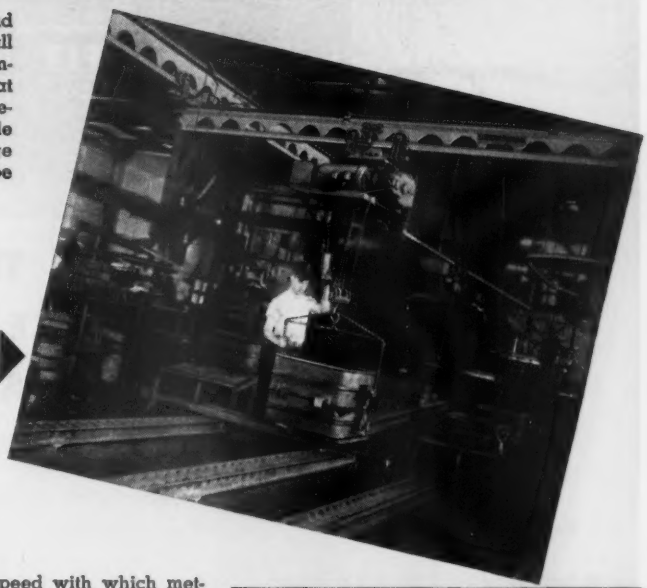
ALL CONTRACTS AND SHIPMENTS ARE SUBJECT TO STRIKES, FIRES, ACCIDENTS AND OTHER CAUSES BEYOND OUR CONTROL.

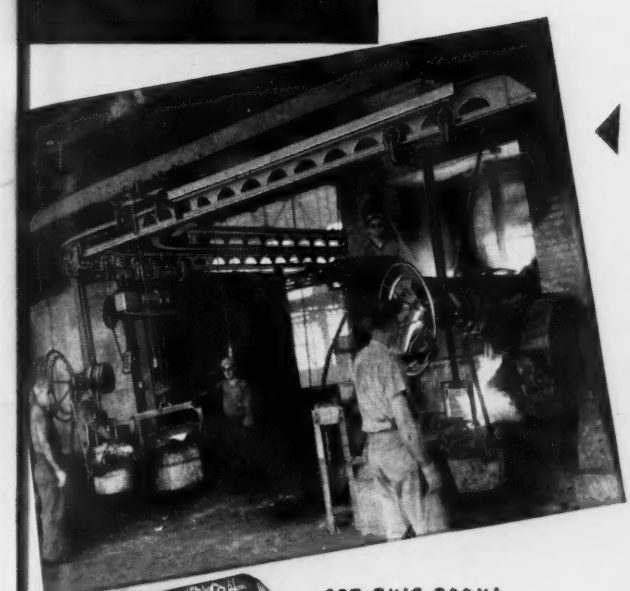
Service PROVIDED BY CLEVELAND at McNALLY PITTSBURG FOUNDRIES



The core room foreman and one core man can handle all cores with a Cleveland Tramrail bridge and hoist that travels the length of the core-making floor. Considerable time would be lost if the large volume of cores had to be hand-lifted.

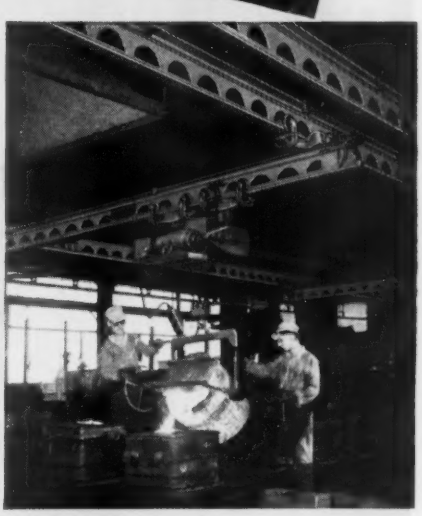
Flasks are easily closed by use of the Tramrail equipment and moved to correct pouring conveyor with minimum lost motion.





The speed with which metal can be handled demonstrates the efficiency of Cleveland Tramrail equipment and the time that can be saved through its use. Ladles leave the cupola in order poured and go directly to pouring stations on three floors without waiting for other ladles.

Pouring the medium floor with an average of 11,000 lbs. per day, the Cleveland Tramrail equipment has proven fast, flexible and safe. This bridge is reserved for this ladle. An average of 139 molds are poured per day.



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BOOKLET No. 2008. Packed with valuable information. Profusely illustrated. Write for free copy

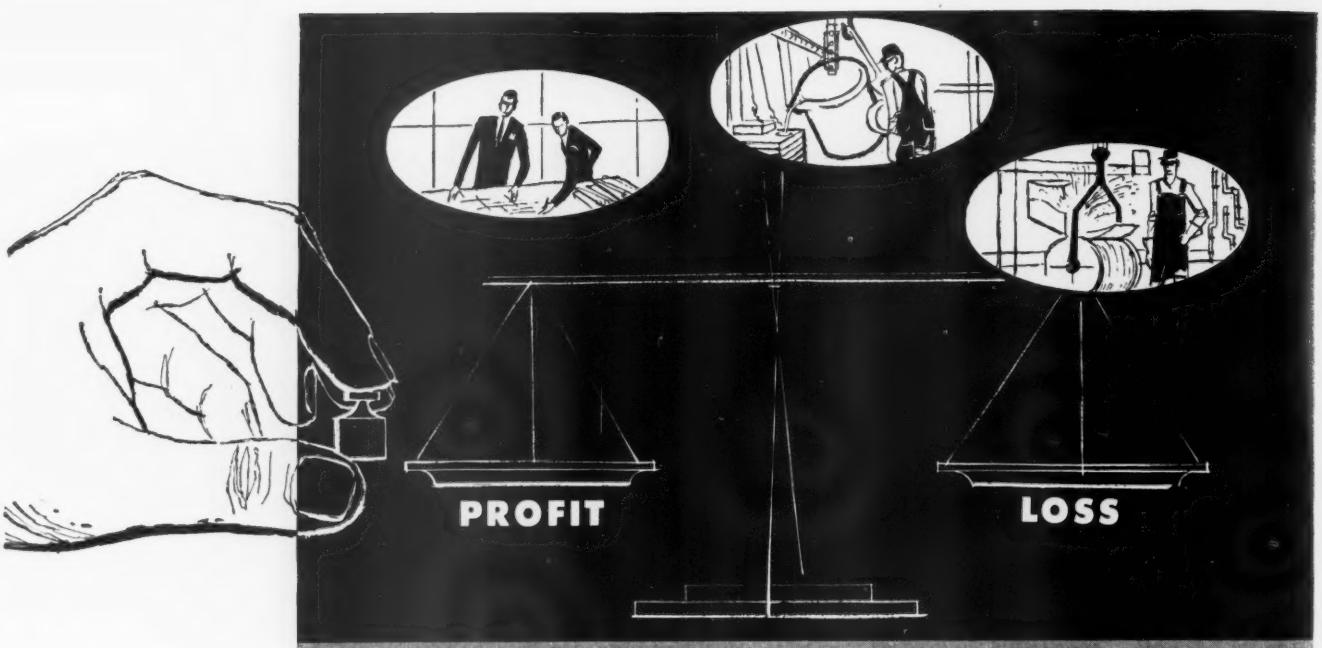
CLEVELAND TRAMRAIL DIVISION

THE CLEVELAND CRANE & ENGINEERING CO.

3826 E. 286TH ST., • WICKLIFFE, OHIO

CLEVELAND TRAMRAIL

OVERHEAD MATERIALS HANDLING EQUIPMENT



Knight services include:

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- Automation
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- Construction Management

The sound way to REALIZE ANTICIPATED PROFITS is to AUDIT your operations

In foundry operation, making the best use of facilities and manpower determines the balance between profit and loss.

In many foundries, management and operation audits by experienced Knight engineers have helped to swing the balance to profit—through low-cost, readily effected improvements.

A recent Knight audit for a Michigan foundry resulted in substantial production increases and reduced costs. Improvements included the installation of a conveyor which eliminated handling . . . a rearrangement which increased capacity without additional floor space . . . and automatic timing devices which brought accurate process control and increased production.

These simple low-cost changes, accomplished without interruption to production, are part of a coordinated plan which is designed for future expansion requirements.

If you are interested in an audit of your operations to establish a program of improvement, take advantage of Knight experience and call of write our Chicago or New York office for prompt attention, without obligation.

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Miller Stock AIR AND HYDRAULIC CYLINDERS

Available for *Immediate Delivery*...

in the popular sizes, mountings and prices listed below

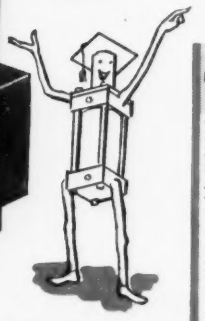
Any of the *Interchangeable* "Stock" Mountings illustrated are attached by our factory to the "in-stock" Basic Model 53 with the tie rod nuts in a few moments. This gives you a selection of over 500 different "Stock" Cylinders for *immediate use*—and permits easy conversion to other models for *future re-use*. Thus, you save delivery and production time, investment cost and storage space.

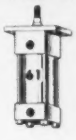
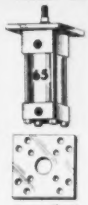
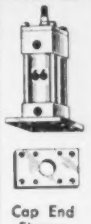
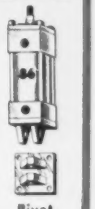
PRICES OF MILLER "STOCK" CYLINDERS WITH MOUNTINGS ATTACHED AS ILLUSTRATED

(Prices on the separate mounting attachments for future re-use are available on request)

ORDER DIRECTLY FROM THIS LIST . . .

Shipment can be generally made within 24 hours after we receive your order. Prices are F. O. B. our plant.



			Basic Model 53		Model 77	Model 61	Model 62	Model 65	Model 66	Model 86
										
			Tie Rod Mounting		Foot Mounting	Rod End Flange	Cap End Flange	Rod End Flange	Cap End Flange	Pivot Mounting
Bore	Stroke	Cushion	AIR A53	HYD. H53	AIR A61 A77	HYD. H61 H77	AIR A62	HYD. H62 H65	AIR A66	HYD. H66 H86
1½"	2"	Non		$ 58.50		$ 61.40		$ 66.70		$ 72.85
1½"	4"	Non		60.70		63.60		68.90		75.05
1½"	6"	Non		62.90		65.80		71.10		77.25
1½"	8"	Non		65.10		68.00		73.30		79.45
1½"	11"	Non		68.40		71.30		76.60		82.75
2"	2"	Non	$ 37.70		$ 39.75		$ 42.30		$ 44.60	
2"	4"	Non	39.40		41.45		44.00		46.30	
2"	6"	Non	41.10		43.15		45.70		48.00	
2"	8"	Non	42.80		44.85		47.40		49.70	
2"	11"	Non	45.35		47.40		49.95		52.25	
2"	3"	Both	62.05	94.50	64.10	97.45	66.65	103.05	68.95	111.55
2"	5"	Both	63.75	97.00	65.80	99.95	68.35	105.55	70.65	114.05
2"	7"	Both	65.45	99.50	67.50	102.45	70.05	108.05	72.35	116.55
2"	9"	Both	67.15	102.00	69.20	104.95	71.75	110.55	74.05	119.05
2"	13"	Both	70.55	107.00	72.60	109.95	75.15	115.55	77.45	124.05
2½"	2"	Non	41.45	73.30	43.70	76.25	46.25	82.30	49.00	93.10
2½"	4"	Non	43.35	76.00	45.60	78.95	48.15	85.00	50.90	95.80
2½"	6"	Non	45.25	78.70	47.50	81.65	50.05	87.70	52.80	98.50
2½"	8"	Non	47.15	81.40	49.40	84.35	51.95	90.40	54.70	101.20
2½"	11"	Non	50.00	85.45	52.25	88.40	54.80	94.45	57.55	105.25
3¼"	3"	Both	77.80	126.85	80.35	131.20	84.15	138.60	87.70	149.95
3¼"	5"	Both	79.80	129.85	82.35	134.20	86.15	141.60	89.70	152.95
3¼"	7"	Both	81.80	132.85	84.35	137.20	88.15	144.60	91.70	155.95
3¼"	9"	Both	83.80	135.85	86.35	140.20	90.15	147.60	93.70	158.95
3¼"	13"	Both	87.80	141.85	90.35	146.20	94.15	153.60	97.70	164.95
4"	2"	Non	56.25	106.00	59.10	111.15	62.95	118.90	67.30	132.80
4"	4"	Non	58.85	109.40	61.70	114.55	65.55	122.30	69.90	136.20
4"	6"	Non	61.45	112.80	64.30	117.95	68.15	125.70	72.50	139.60
4"	8"	Non	64.05	116.20	66.90	121.35	70.75	129.10	75.10	143.00
4"	11"	Non	67.95	121.30	70.80	126.45	74.65	134.20	79.00	148.10
5"	3"	Both	98.25		101.40		105.25		110.60	
5"	5"	Both	101.65		104.80		108.65		114.00	
5"	7"	Both	105.05		108.20		112.05		117.40	
5"	9"	Both	108.45		111.60		115.45		120.80	
5"	13"	Both	115.25		118.40		122.25		127.60	
6"	2"	Non	80.60		83.95		87.85		94.15	
6"	4"	Non	84.90		88.25		92.15		98.45	
6"	6"	Non	89.20		92.55		96.45		102.75	
6"	8"	Non	93.50		96.85		100.75		107.05	
6"	11"	Non	99.95		103.30		107.20		113.50	
8"	3"	Both	157.35		161.05		167.90		174.95	
8"	5"	Both	162.45		166.15		173.00		180.05	
8"	7"	Both	167.55		171.25		178.10		185.15	
8"	9"	Both	172.65		176.35		183.20		190.25	
8"	13"	Both	182.85		186.55		193.40		200.45	

er "Stock" Cylinders fully meet the J.I.C. ndards and are identical to Miller "Custom-" Cylinders in design and construction.

ck" Air Cylinders are for 200 psi opera-, "stock" hydraulic cylinders for 2000-3000 peration. Piston Rods of "Stock" Cylinders "Style No. 2 Standard."

complete descriptive and dimensional a on both "Stock" and "Custom-Built" Miller inders, write for Bulletins A-105 and H-104 FREE on request.

Sales and Service From Coast to Coast!

Consult your local directory or write us direct for the name of our representative for your area

"Stock" Boosters, Too! Immediate delivery on Miller Dual Pressure Boosters; 5" bore, 1" ram (80 psi air input produces 2000 psi hydraulic output for driving one or more work cylinders simultaneously). In 6" and 12" strokes. Write for data and prices.

plete Miller "custom-built" line includes: air cylinders, 1½" to bores, 200 psi operation; low pressure hydraulic cylinders, to 6" bores for 500 psi operation, 8" to 14" bores for 250 psi ration; high pressure hydraulic cylinders, 1½" to 12" bores, 0-3000 psi operation. All mounting styles available. Also, a plete line of Fluid Pressure Boosters and Accumulators.

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(Formerly MILLER MOTOR COMPANY)

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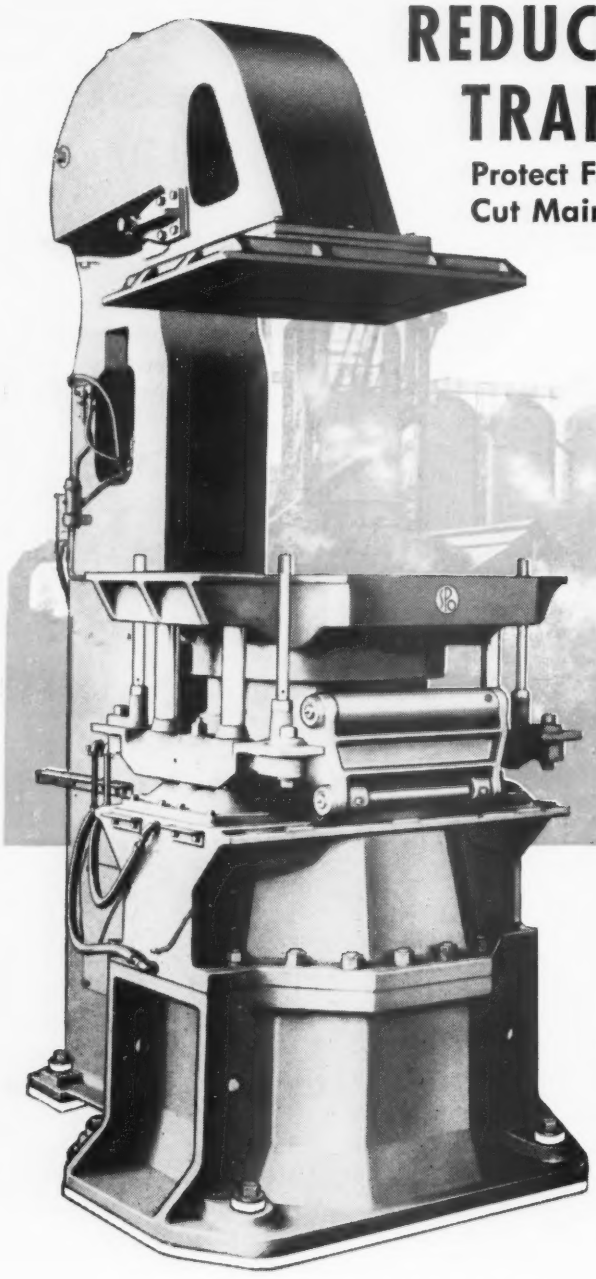
AIR & HYDRAULIC CYLINDERS • BOOSTERS • ACCUMULATORS

COUNTERBALANCE CYLINDERS

FABREEKA *Pads*

REDUCE IMPACT SHOCK and TRANSMITTED VIBRATION

Protect Foundations and Machines
Cut Maintenance Costs and Improve Production



For severest service under heavy loadings, it pays to specify FABREEKA Pads, proven by over 20 years successful performance.

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FABREEKA PADS
IN THE STEEL INDUSTRY

STEEL PLANTS—Traveling Bridge Cranes, Ore Bridges, Ingot Trucks and Buggies, Skip Hoists, Transfer Cars, Pusher Tracks.

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METAL FABRICATING—Punch Presses, Shears, Broaches, Grinders, Milling Machines, Planers, Swedging Machines.

Write for engineering data on over fifty different types of applications in the basic steel and metal working industries.

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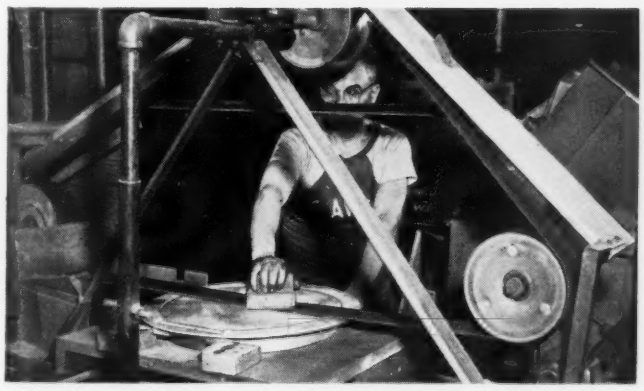
3M METHOD—better from start to finish

3M Abrasive Belts increase production 50% for Connecticut Foundry



25 finished castings per belt on this unusual 3M installation! 3M Coated Abrasives are versatile production "tools," designed to do the best possible grinding and finishing job.

Made in U.S.A. by Minnesota Mining and Mfg. Co., St. Paul 6, Minn.—also makers of "Scotch" Brand Pressure-Sensitive Tapes, "Scotch" Brand Magnetic Tape, "Underseal" Rubberized Coating, "Scotchlite" Reflective Sheeting, "Safety-Walk" Non-slip Surfacing, "3M" Adhesives. General Export: 122 E. 42nd St., New York 17, N. Y. In Canada: London, Ont., Can.

Brown Bros. Foundry, Inc., Stamford, Conn., obtained this production increase when they switched to the 3M Method of grinding and finishing the flat areas on cast aluminum garbage disposal covers. Their former method of wire brushing was slow and difficult, left unsatisfactory finishes. A 3M Representative suggested that a stroke sander—using 3M Abrasive Belts—would solve the problem. Result—production increased 50% with far better finishes!

Here's further proof of the efficiency of 3M Coated Abrasives, *and* of the 3M Representative. He's an expert on coated abrasives who can show you how the 3M Method can work best in *your* foundry. Send coupon today for facts.

—Write today for FREE booklet!—

Minnesota Mining and Mfg. Co.
Dept. F-94, St. Paul 6, Minn.

☐ Send free booklet on grinding of non-ferrous metals
☐ I'd like to talk to a 3M Representative

Name..... Title.....

Company.....

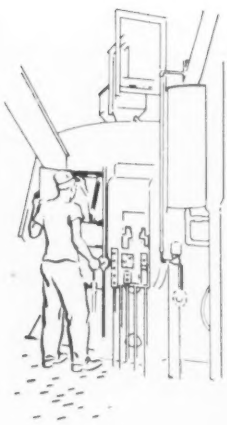
Address.....

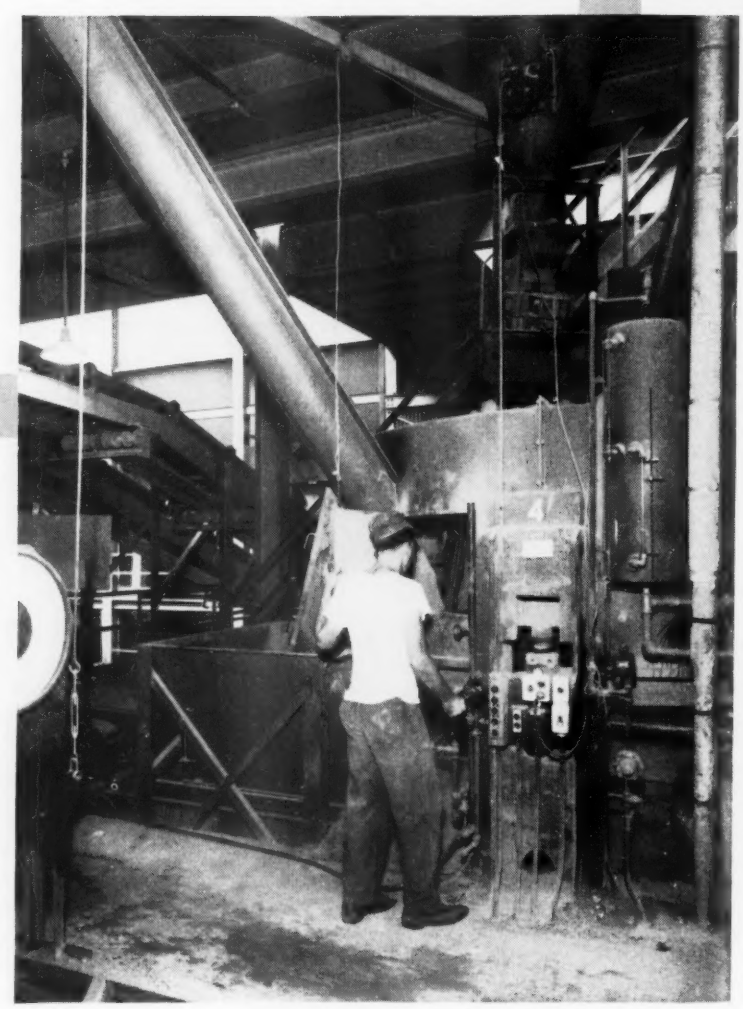
City..... Zone..... State.....

My Distributor is.....

PERFECT SAND PREPARATION CAN BE AUTOMATIC

with a *Clearfield Mixer*





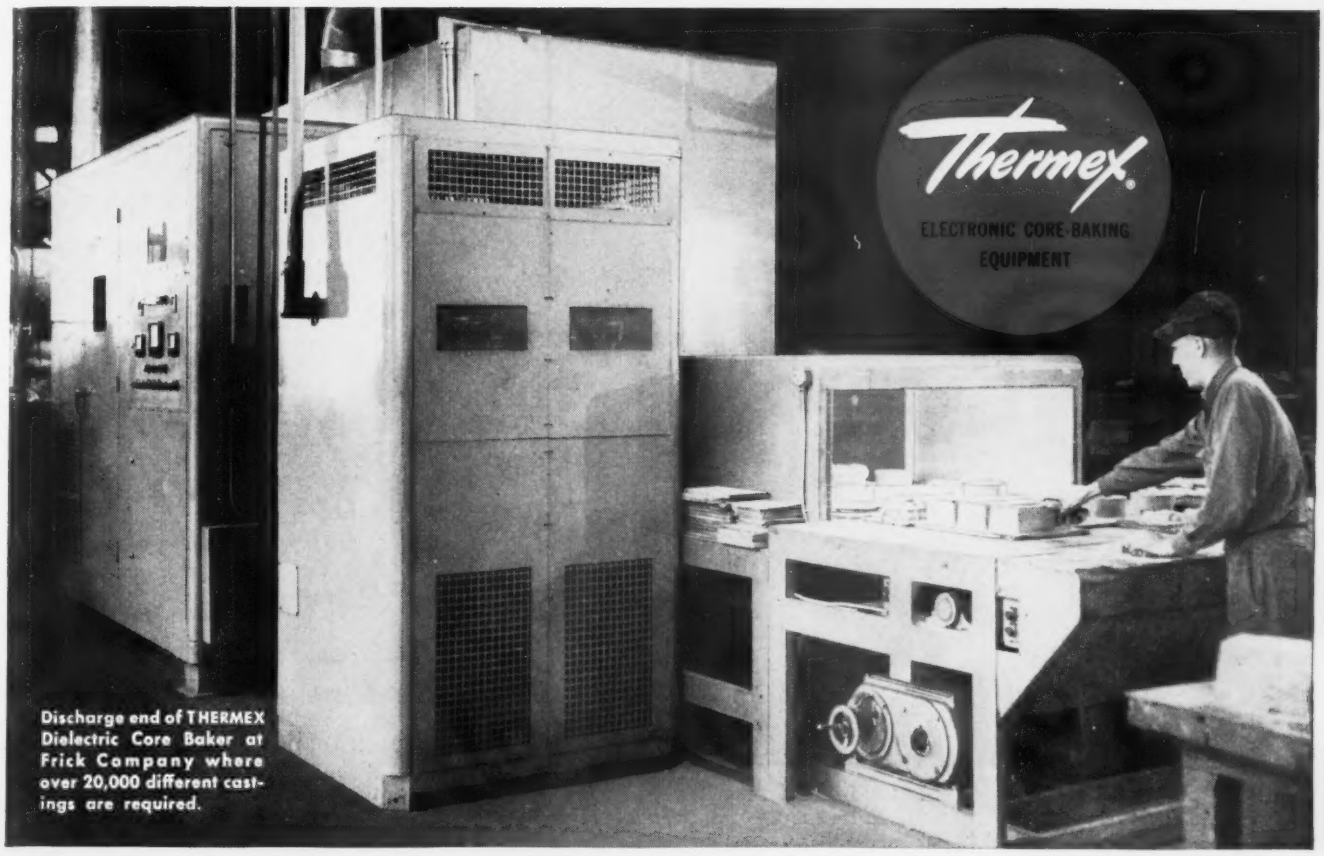
Any Clearfield Mixer can be made completely or partially automatic by the addition of suitable time control apparatus. Thus you can substitute a predetermined, uniform procedure for the individual judgment of the operator, controlling minutely the length of tempering, the quantity of bond and all other factors. The result is consistent uniformity in the characteristics of your sand, one of Clearfield's many outstanding services.

For any sand preparation need there's a Clearfield Mixer. Write today for Catalog No. 83 for complete details.

CLEARFIELD
MACHINE COMPANY

CLEARFIELD
PENNSYLVANIA, U.S.A.

One of nine No. 920 Clearfield Mixers, all equipped with automatic controls, located in a large Eastern industrial plant.



Discharge end of THERMEX Dielectric Core Baker at Frick Company where over 20,000 different castings are required.

How Frick Company has improved core quality and working conditions

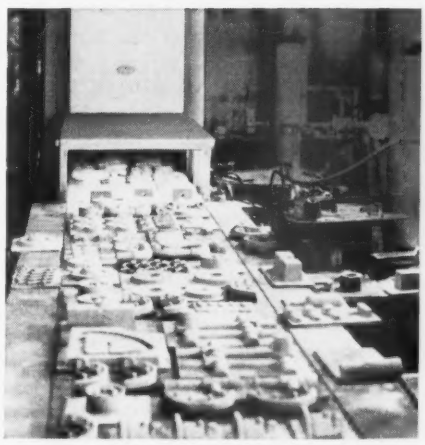
REPLACING conventional ovens with a 75 KW THERMEX* Core Baker at Frick Company, Waynesboro, Pa. has resulted in improved core quality . . . faster, more flexible production . . . a cleaner core room and saving of floor space.

IMPROVED QUALITY. Uniform electronic baking gives smoother core surfaces and greater dimensional accuracy. No longer necessary to paint cores to prevent iron penetration.

IMPROVED WORKING CONDITIONS. No smoke. No oven heat. Cores are cool enough to handle immediately after baking . . . move faster to finishing and pasting.

Find out how THERMEX Core Baking Equipment can improve your core room efficiency. Write today for data booklet on Electronic Core Baking. The Girdler Company, Thermex Division, Louisville 1, Kentucky.

*THERMEX—Trade-mark Reg. U. S. Pat. Off.

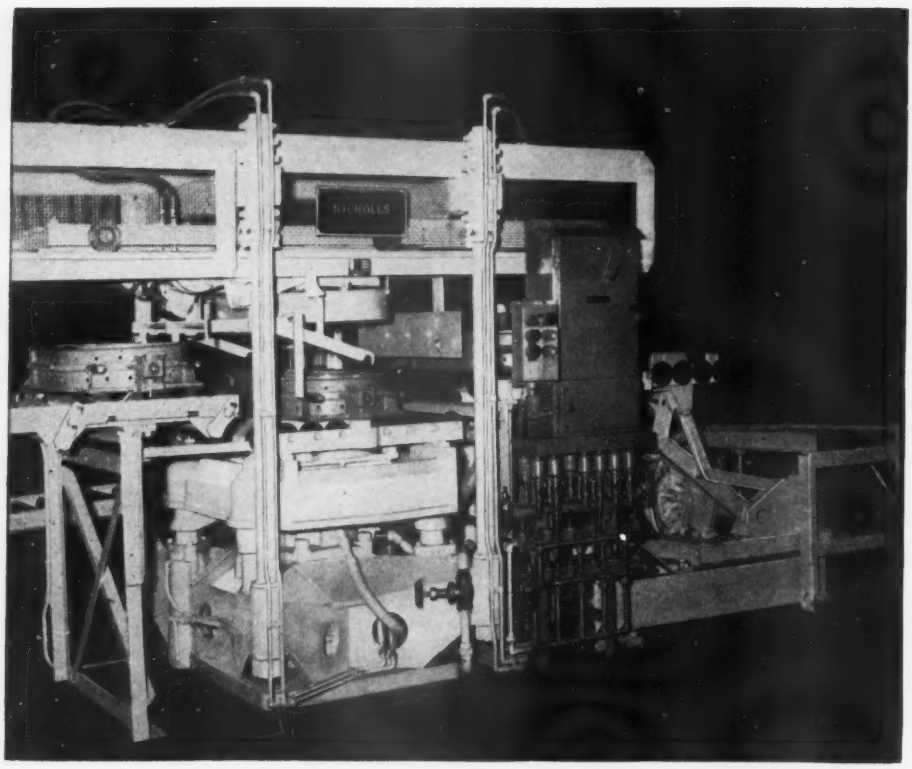


Intake end of THERMEX Core Baker showing variety of cores on belt, which moves at about 7 inches per minute. Typical Frick cores where accuracy is important: (Right above) For portable sawmill gear. (Right below) For ammonia valve body.

the GIRDLER Company

A DIVISION OF NATIONAL CYLINDER GAS COMPANY

THERMEX DIVISION



No. 21 Type C. F.—Jolt, Squeeze and Pattern Draw — Automatic - Push Button Control

(Also Made in Smaller and Larger Sizes)

New "Push-Button" Operation Takes The Guesswork Out of Molding

From start to finished mold, the Nicholls #21 Type CF Jolt, Squeeze and Pattern Draw Molding Machine is push-button controlled to eliminate dangerous risks, costly mistakes—to give you better molds *continuously*. Precision built for long years of service . . . made with all the safety-devices, the hidden "quality points" that reduce maintenance costs . . . the know-how that almost half a century of building quality molding machines has made possible. If you're interested in better quality molds at lower cost — investigate these machines now.

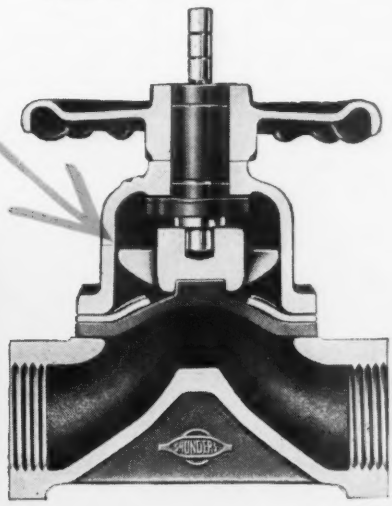
For complete information, write to:

William H. Nicholls Co., Inc.

Richmond Hill 18, Long Island, New York

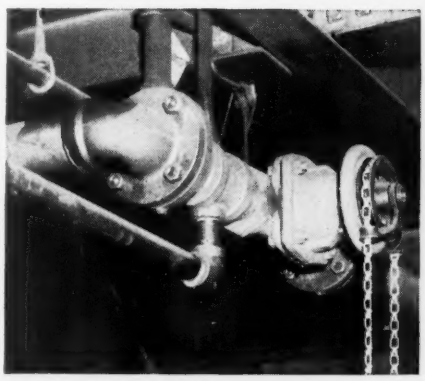
NICHOLLS

THE IDEAL VALVE FOR FOUNDRY USE

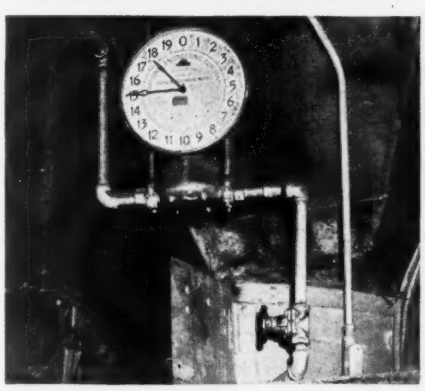


unexcelled for

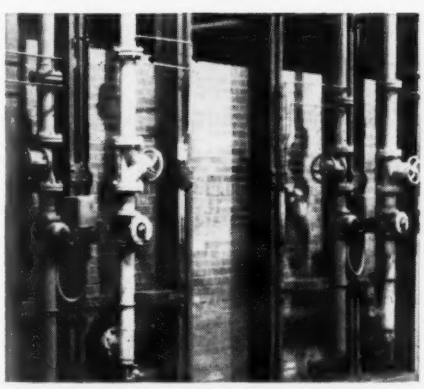
AIR...
WATER...
GAS!



COMPRESSED AIR — Chain wheel operated Grinnell-Saunders Diaphragm Valve on an elevated main air line to molding stations.



WATER — Grinnell-Saunders Diaphragm Valve on precision water metering line to molding sand muller in foundry.



GAS — Grinnell-Saunders Diaphragm Valves handling producer gas for annealing furnaces.

GRINNELL-SAUNDERS DIAPHRAGM VALVES

Credit the flexible, easy-to-replace diaphragm with providing important advantages. The diaphragm lifts high for streamlined passage, in either direction; closes tightly for an absolute seal, even when scale lodges on the valve weir.

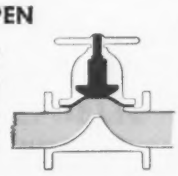
That feature alone can mean impressive savings. For a *single* leak in a valve on an air line, even as tiny as 1/32-inch, can waste in one month's time, the equivalent of the cost of a new Grinnell-Saunders Diaphragm Valve.

Grinnell-Saunders Diaphragm Valves offer other advantages, too. Bodies, linings, and diaphragm materials are available to meet most service conditions. The only part that ever needs replacing is the diaphragm, which can be changed in minutes without removing the valve body from the line. In downtime and overtime saved — in maintenance and repair work avoided — you are dollars ahead when you rely on Grinnell-Saunders Valves.

Grinnell-Saunders Diaphragm Valves, packed in cartons, are stocked by Grinnell branch warehouses and distributors from coast to coast. Write for Grinnell-Saunders Diaphragm Valve catalog.

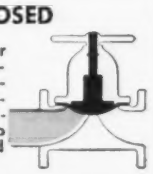
OPEN

No packing glands to demand attention. Working parts are isolated from fluid . . . sticking, clogging, contamination, corrosion eliminated.



CLOSED

Compressor or finger plate supports the diaphragm in all positions. No metal-to-metal seats to become damaged or wire-drawn.



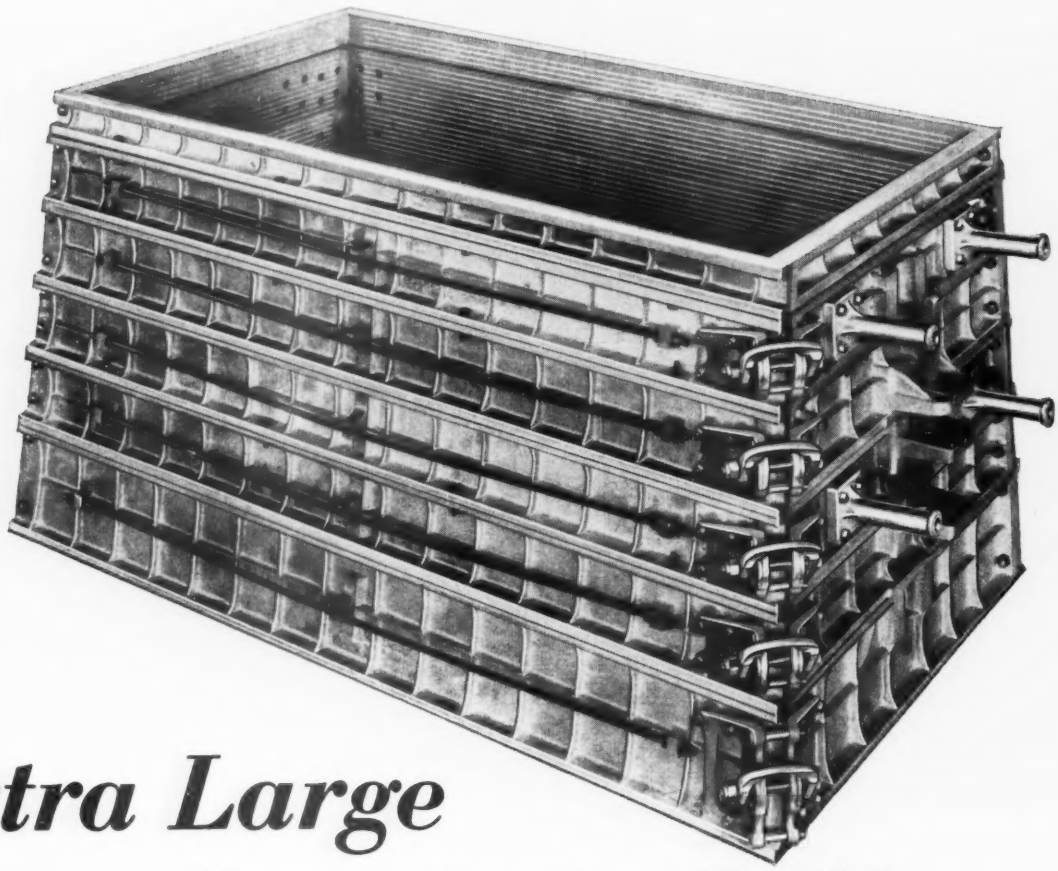
GRINNELL

WHENEVER PIPING IS INVOLVED

Grinnell Company, Inc., Providence, Rhode Island • Coast-to-Coast Network of Branch Warehouses and Distributors

pipe and tube fittings • welding fittings • engineered pipe hangers and supports • Thermolier unit heaters • valves
Grinnell-Saunders diaphragm valves • pipe • prefabricated piping • plumbing and heating specialties • water works supplies
industrial supplies • Grinnell automatic sprinkler fire protection systems • Amco air conditioning systems

ADAMS *Aluminum Easy-Off Flasks*



Extra Large
For Big, Heavy Casting Problems

These flasks, equipped with upsets as illustrated above, offer you a maximum in depth combinations to suit many pattern contours. Adams construction features make them last longer . . . assure the production of more good castings in each day's run. Cast iron and aluminum jackets in these same extra large sizes are available to complete this outstanding combination.

- **Rigid construction**
- **Solid corners**
- **Malleable trimmings**
- **Steel protecting strips**
- **Handles and trunnions (avail. when specified)**

Write today for further information.

The ADAMS Company

ESTABLISHED 1883

MOLDING MACHINES and FLASK EQUIPMENT

700 Foster Street, Dubuque, Iowa, U.S.A.

For technical and practical foundry advice

On the technical side he's a metallurgist. He knows all types of pig irons and their characteristics. He knows what they will do and what they will not do under certain conditions. He keeps up to the minute on all foundry techniques.

The Republic Pig Iron Metallurgist is also a practical foundryman. He has a solid foundry background gained from years of actual experience.

You can count on him for advice—for quick, accurate answers to specific questions on molding practice, improving castings or cutting production costs.

Why not make it a practice to call in the Republic Pig Iron Metallurgist when you need help or advice? Hundreds of foundrymen do. And, there's no cost or obligation for his service.

Write, wire or phone us when you would like him to call at your plant.

REPUBLIC STEEL CORPORATION
GENERAL OFFICES • CLEVELAND 1, OHIO
Export Department: Chrysler Building, New York 17, New York

REPUBLIC PIG IRON

"CHATEAUGAY"	REPUBLIC	REPUBLIC
Low-Phosphorous, Copper-Free	(Northern) Foundry, Bessemer Basic and Malleable	(Southern) Foundry and Basic

REPUBLIC STEEL

EVERY NUMBER LEGIBLE because of die cast print wheels ...SO

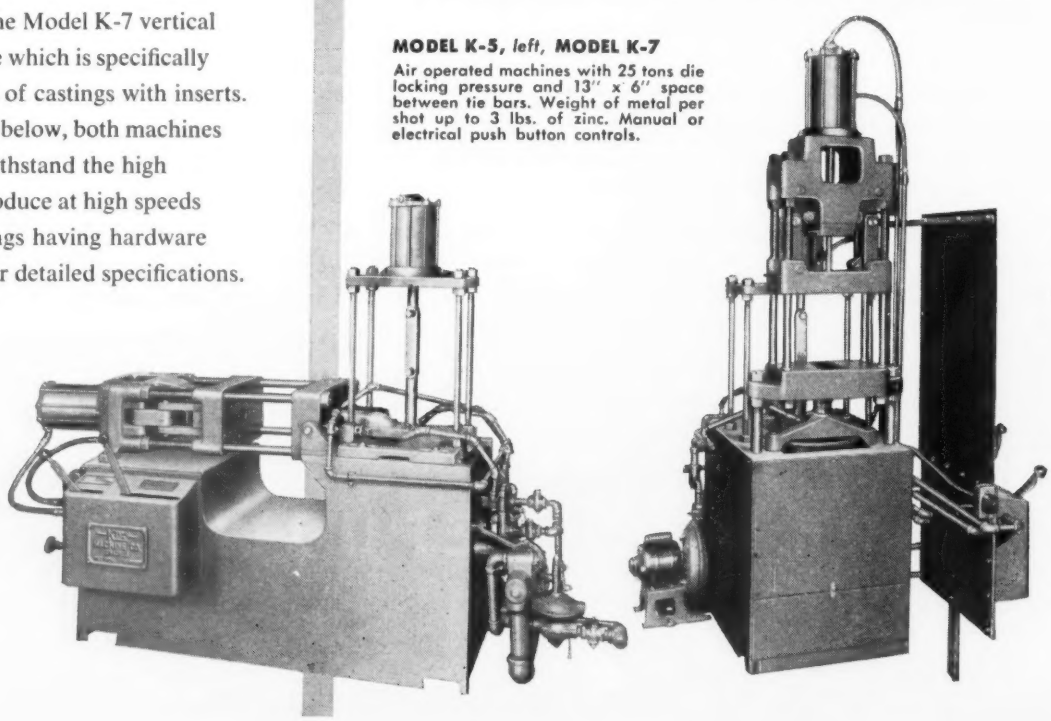
The mechanical brain of a Burroughs Corporation business machine cannot afford mistakes . . . every number must print in perfect alignment and be clearly legible. Helping Burroughs provide this unerring accuracy are radially cored die cast print wheels containing the numbers. These small print wheels, requiring machine tool precision and close tolerances, are made on KUX die casting machines. KUX machines were chosen because they can be depended on for casting parts of exacting dimensions with fine detail. Burroughs says production of print wheels has increased, "AND A BETTER PRODUCT IS OFFERED MORE ECONOMICALLY."

The wheels are cast on the Model K-7 vertical type center shot machine which is specifically designed for production of castings with inserts. Like the Model K-5, left below, both machines are massively built to withstand the high pressures required to produce at high speeds small, solid, dense castings having hardware quality finishes. Write for detailed specifications.

Burroughs chose Kux die casting machines

for production of these finely detailed parts

MODEL K-5, *left,* **MODEL K-7**
Air operated machines with 25 tons die locking pressure and 13" x 6" space between tie bars. Weight of metal per shot up to 3 lbs. of zinc. Manual or electrical push button controls.



Kux
MACHINE COMPANY
6725 Ridge Avenue
Chicago 26, Ill.

LESS FLOOR SPACE is required by these G-E furnaces. They take up only ⅓ to ½ the area occupied by old-style furnaces of equal capacity. Working conditions are improved because G-E furnaces minimize dust, dirt, and radiant heat.

Eastern Malleable Cuts Annealing Costs By Changing to General Electric Furnaces

Substantial savings in the cost of annealing malleable iron have been realized by Eastern Malleable Iron Co. since they installed General Electric elevator furnaces in their Naugatuck, Conn., plant.

5 BIG SAVINGS REPORTED

Eastern's assistant manager reports 5 significant savings that they have gained with G-E furnaces:

Lower in-process inventory and better customer service because annealing time is reduced.

Reduced pot costs—heavy cast pots are replaced by light containers that speed up heating and cooling of the charge and do not oxidize. Tightly-sealed furnaces minimize loss of natural gas atmosphere.

Decreased labor costs because G-E furnaces eliminate sand packing and fuel handling. Clean-up time is also minimized because there is no dust with electric heat.

Lower cleaning costs because G-E furnaces minimize oxidation and fused-on packing material.

Reduced rejects because G-E furnaces provide uniform heat and precise control over the time-temperature cycle.

G-E APPLICATION ASSISTANCE

Eastern Malleable's experience is another example of the benefits of modern metal processing with electric furnaces. To improve your operation, look to General Electric, a pioneer in the development of better industrial heating equipment. G-E service facilities are unmatched by any other heating equipment manufacturer. For application help from a G-E Heating Specialist, contact your nearest G-E Apparatus Sales Office.

GENERAL ELECTRIC

WRITE NOW FOR THESE MODERN METAL PROCESSING BULLETINS

- **Furnace and Induction Brazing, GEA-5889**
- **Annealing Malleable Iron, GEA-5797**
- **Forging with Induction Heat, GEA-5983**
- **Heat-treating Aluminum, GEA-5912**

Address: General Electric Co., Section 720-132, Schenectady 5, N. Y.

One wash... many uses...

saves you time and money

ZIRCONITE* Paste Wash is called a "universal" wash. To be specific, here are a few of its many applications in steel, iron, bronze, aluminum and magnesium foundries:

For green and dry sand cores and molds, metal chills, permanent molds, stirring rods, skimmers, thermocouple tips, crucibles, ladles, runners, furnace spouts and heat treating furnace brick.

It also is used successfully as a patching material for cores, ladles, furnace linings, and similar applications.

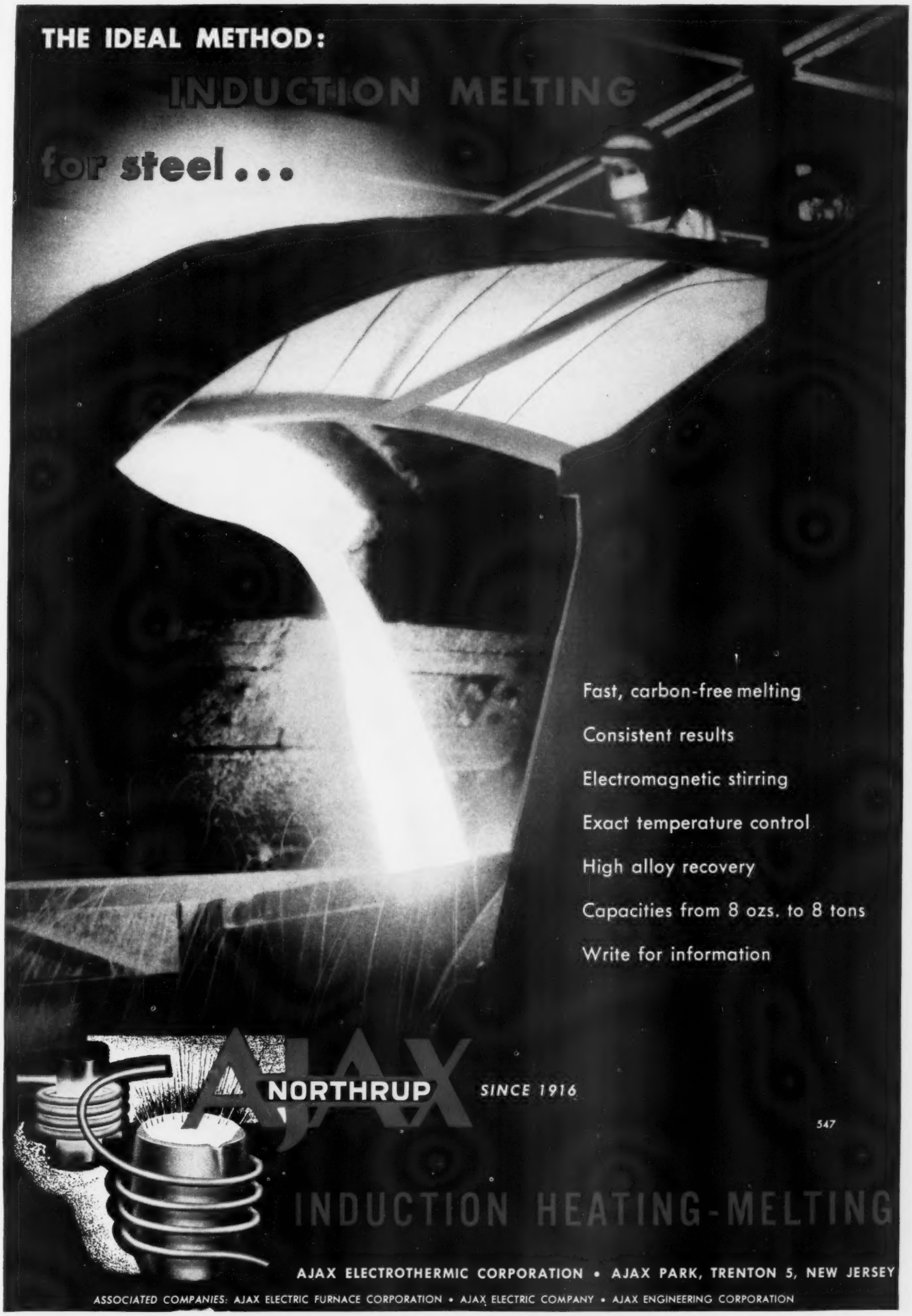
The proof of performance is in its properties. It will not fuse with molten metal, it resists metal wetting, prevents metal penetration and produces smooth casting surfaces.

TAM PRODUCTS
Registered U. S. Pat. Off.

TITANIUM ALLOY MFG. DIVISION
NATIONAL LEAD COMPANY
Executive and Sales Offices:
111 Broadway, New York City
General Offices, Works and Research Laboratories.
Niagara Falls, New York

When you write for detailed data and prices, ask about ZIRCONITE* Sand and Flour. They are time and money savers, too.

*Registered trademark


THE IDEAL METHOD:
INDUCTION MELTING
for steel...
Fast, carbon-free melting
Consistent results
Electromagnetic stirring
Exact temperature control
High alloy recovery
Capacities from 8 ozs. to 8 tons
Write for information
AJAX
NORTHRUP
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INDUCTION HEATING-MELTING
AJAX ELECTROTHERMIC CORPORATION • AJAX PARK, TRENTON 5, NEW JERSEY
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DELTA Core and Mold Washes

for

Closer Tolerance.. Better-Finish Castings

•

... Lower Cleaning Room Costs.....

•

... Less Scrap...

•

•

IMPORTANT REASONS WHY MORE FOUNDRIES USE DELTA CORE AND MOLD WASHES TO SPEED PRODUCTION AND REDUCE COSTS

DELTA CORE AND MOLD WASHES *"Anchor" themselves by penetrating from 4 to 7 grains deep into the sand.* This bond between the wash and the sand . . . an exclusive DELTA feature . . . produces an expansion-resisting coating essential to the production of finer finished castings.

The dry compression strength increases with each degree rise in temperature up to 500° F when the hot compression strength takes over. *The hot compression strength* increases with each degree of temperature rise up to 2900° F. The ultimate hot compression strength of the wash is over 1000 p.s.i.

There is no gas leakage through Delta Core and Mold washed surfaces. Gases produced by decomposition of organic binders in the core sand cannot leak through Delta Core and Mold washed surfaces to contact the molten metal. Only DELTA CORE AND MOLD WASHES provide this unique and all-important insurance against defective castings resulting from gas leakage.

DELTA

There is a DELTA Wash for every type of Metal Casting.

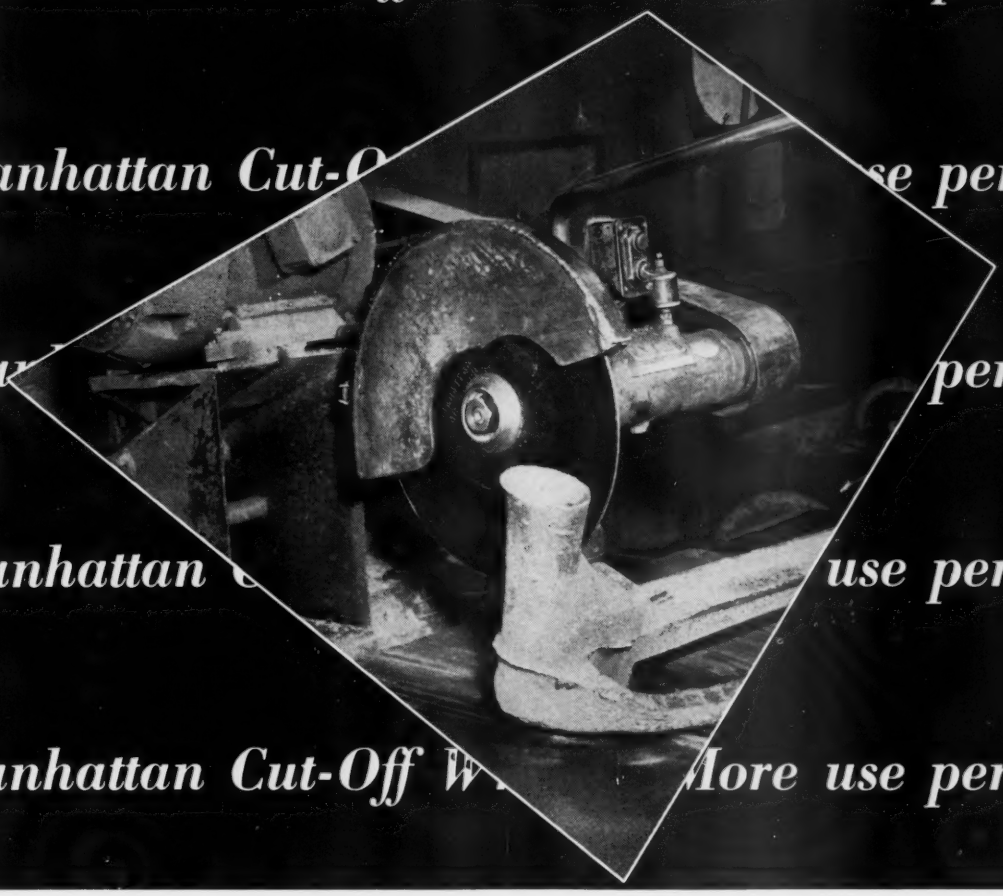
Working samples and complete literature on Delta Foundry Products will be sent to you on request for test purposes in your own foundry.

DELTA OIL PRODUCTS CO.

MANUFACTURERS OF SCIENTIFICALLY CONTROLLED FOUNDRY PRODUCTS

MILWAUKEE 9, WISCONSIN

Manhattan Cut-Off Wheels—More use per dollar



Manhattan Cut-Off Wheels—More use per dollar

REINFORCED FOR FOUNDRY CUT-OFF . . . Manhattan Reinforced Cut-Off Wheels are specially designed to perform under conditions of side-strain far beyond the limits of ordinary cut-off wheels . . . to perform safely and dependably under the toughest operating conditions. The result — more and faster work . . . with safety . . . at real savings to the foundry owner.

Try Manhattan Reinforced Foundry Cut-Off Wheels and note how their special lateral reinforcement gives you MORE USE PER DOLLAR. You will also find similar engineering features built into other Manhattan abrasive and diamond wheels.

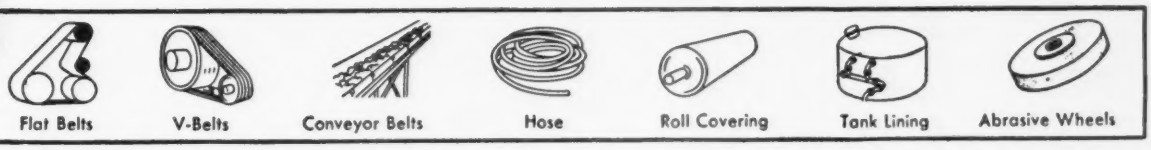
GRINDING WHEEL INSTITUTE MEMBER

WRITE TO ABRASIVE WHEEL DEPARTMENT

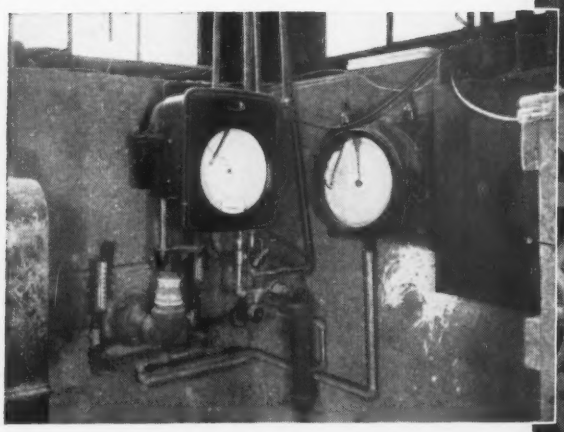
R/M

MANHATTAN RUBBER DIVISION — PASSAIC, NEW JERSEY

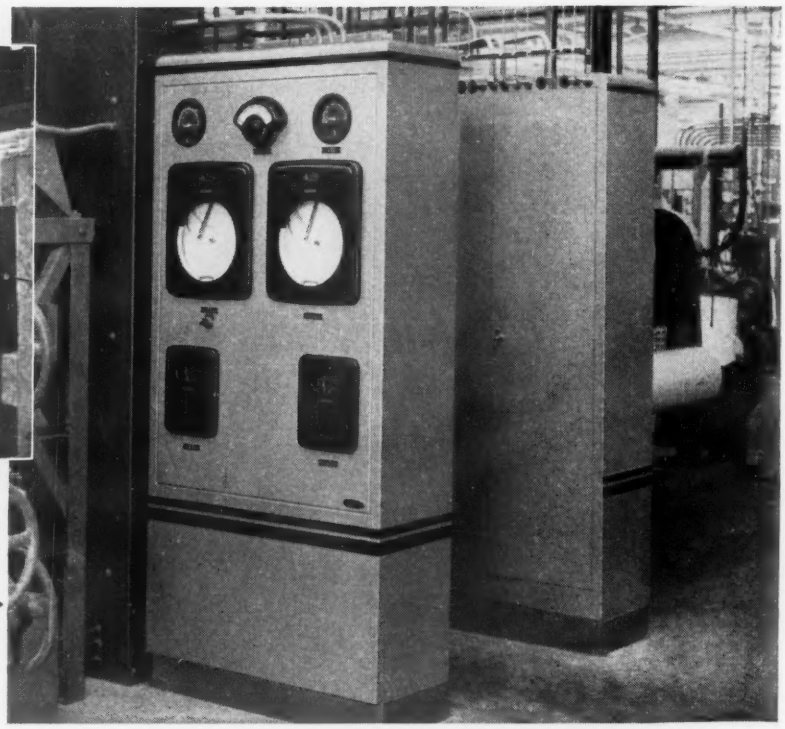
RAYBESTOS-MANHATTAN, INC.



Other R/M products include: Industrial Rubber • Fan Belts • Radiator Hose • Brake Linings • Brake Blocks • Clutch Facings
Asbestos Textiles • Teflon Products • Packings • Sintered Metal Parts • Bowling Balls



This is part of an old-fashioned installation which lacks the convenience and efficiency of modern instrumentation.

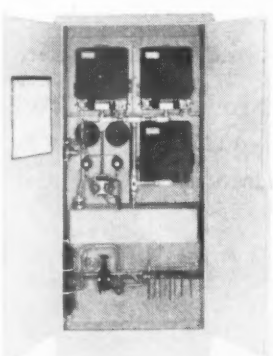


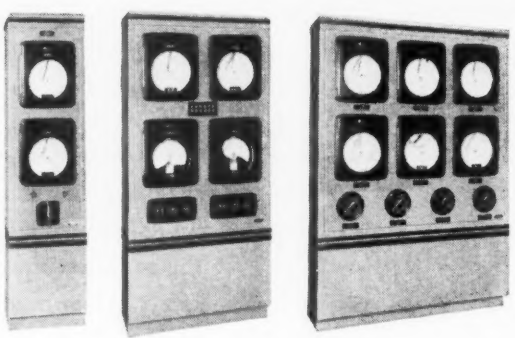
Compare this centralized Foxboro Cabinet installation of similar instrumentation, which saves time for the operator, makes his work more efficient, and gives maximum protection to the precision instruments required for his process.

See what a difference FOXBORO cabinet-mounting can make!

These photos show at a glance how much more efficient and attractive your instrument installation can be if it's integrated and centralized in a Foxboro Cabinet. Not only are the instruments protected from dust and process "atmospheres", but they're conveniently grouped together for more efficient use and easier maintenance. Those "endless steps" of the operator are a thing of the past!

Foxboro will supply a cabinet (or cabinets) to house and protect any number of existing instruments and related devices. Or your order for new instruments can be shipped to you already mounted in cabinets, completely piped and wired, needing only simple power and process connections to be put into operation. Write for illustrated and informative Bulletin 413.





Foxboro Cabinets are available in three standard sizes for 2, 4, or 6 conventional-size instruments (or equivalent). For mounting more than 6 instruments, Foxboro Sectional Cabinets (with open ends) are used . . . bolted together to form desired length. End sections have one closed side to form dust-tight enclosure. Exclusive insert-type panel construction permits easy conversion when process changes so require.

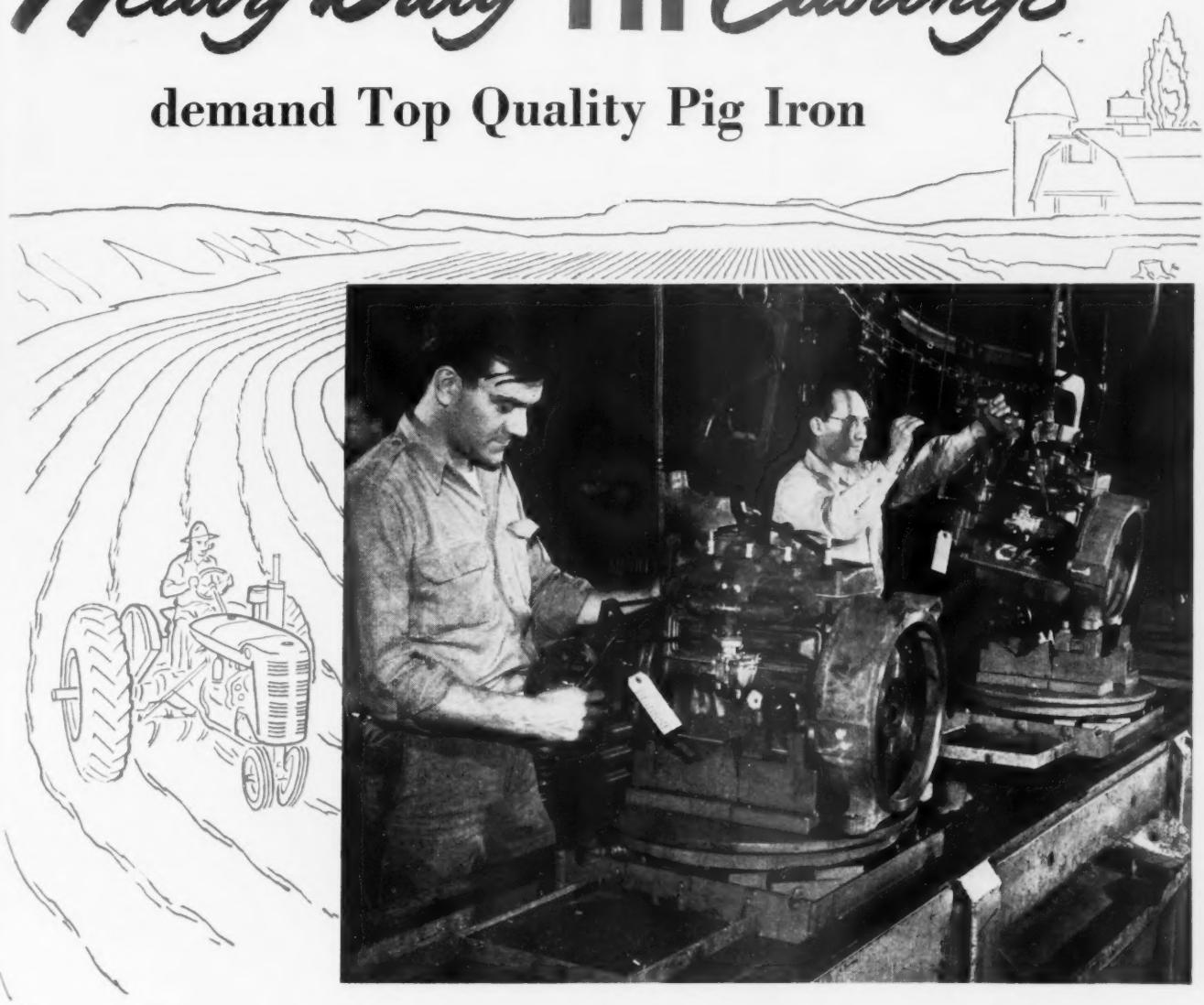
THE FOXBORO COMPANY, 329 NEPONSET AVENUE, FOXBORO, MASS., U. S. A.

FOXBORO REG U S PAT OFF PROCESS CONTROL CABINETS

FACTORIES IN THE UNITED STATES, CANADA, AND ENGLAND

Heavy Duty IH *Castings*

demand Top Quality Pig Iron



TRACTOR engines have to be tough to withstand the constant heavy duty service that's part of everyday farm use. That's why the International Harvester Company sets rigid quality specifications on the pig iron they use for tractor engine castings and other important cast parts. For many years International Harvester has relied upon the uniform composition and high quality of Neville Pig Iron. ● If you have a problem of maintaining special properties in your castings, chances are we can help you, too. Why not call or write us *today?*

W&D 4922

NEVILLE

Quality Pig Iron for the Foundry Trade

PIG IRON DIVISION

PITTSBURGH

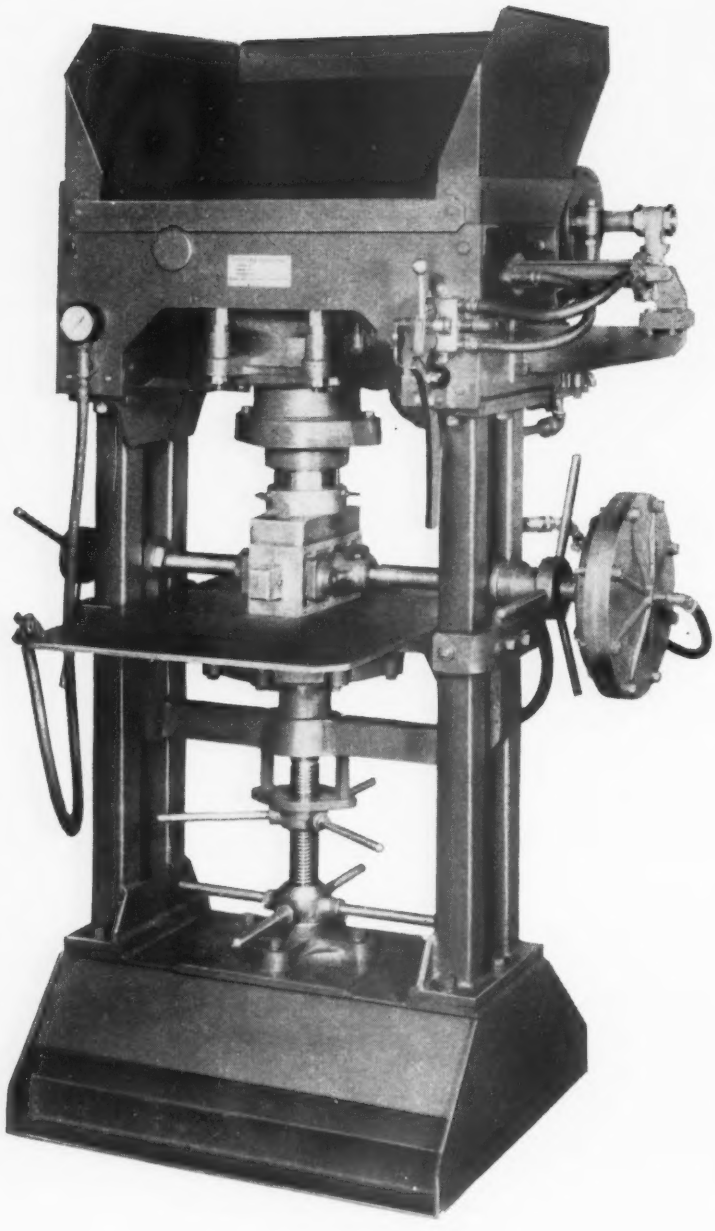
COKE & CHEMICAL CO.

Grant Building · Pittsburgh 19, Pa.

COAL CHEMICALS • AGRICULTURAL CHEMICALS • FINE CHEMICALS • PROTECTIVE COATINGS • PLASTICIZERS • ACTIVATED CARBON • COKE • CEMENT • PIG IRON

Redford NO. 4

CORE BLOWER



Designed to add more power, capacity and speed to traditional Redford simplicity, flexibility and convenience, the No. 4 Redford superbly fills the need for a truly fast and flexible machine to blow cores from a few ounces to 10 lbs.

There is no need for the operator to wait for the machine at any time—the fast operating cycle permits immediate release of the core box after the cores have been blown.

Exhaust air is utilized to thoroughly fluff the sand remaining in the sand magazine after each blow, thus reducing the possibility of cratering.

Magazine heads normally furnished with the No. 2 Redford machine can be used with the No. 4 Redford. Larger new type magazine heads are also available as standard equipment.

A completely new fully adjustable clamp for vertically parted core boxes simplifies core box set up—when not needed the clamp units can be adjusted all the way out or completely taken off the machine.

Redford No. 4 users report production up to 8 boxes per minute using only one core box per machine. To get complete information write for Specification Bulletin 4.

Cores at right illustrate wide range of work that can be done with the Redford No. 4 Core Blower.

Redford IRON & EQUIPMENT CO.

20733 GLENDALE AVENUE • Phone KEnwood 1-8611 • DETROIT 23, MICHIGAN

We can CUT your Bulk Material Handling Cost

Let us prove . . . BY A DEMONSTRATION . . . the many advantages of loading with the combination of Clutch-Type Transmission and Hydraulic Torque Converter . . . brought to you by the

TRACTOMOTIVE TL-10 TRACTOLOADER

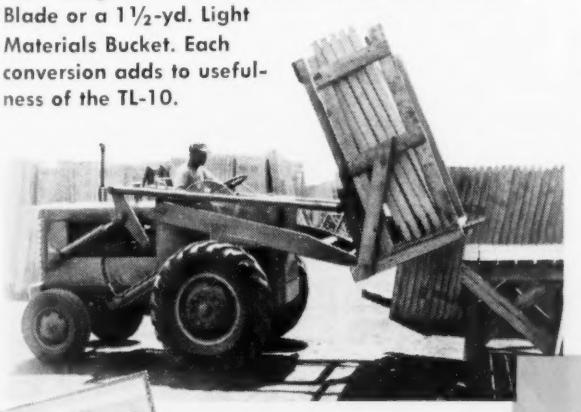
SEE how the smooth-operating HYDRAULIC TORQUE CONVERTER DRIVE speeds loading — no butting or ramming, no engine stalling. No clutching either — operator crowds steadily into pile using only the foot throttle and bucket control levers. Wheel spin is practically eliminated, tire wear greatly reduced. Bucket action is snappy at all times because speed of engine and hydraulic pump remain constant.

SEE how the specially designed CLUTCH-TYPE TRANSMISSION eliminates most shifting. You simply push a lever to go forward, pull it back for reverse. Reverse is almost twice as fast as forward.

SEE how easy it is to maneuver the TL-10. Bucket over drive wheels utilizes weight of load for greater traction... eases weight on rear steering wheels. Turning radius is only 11 ft. at tip of bucket . . . works in areas that would normally accommodate only lower capacity machines. You can turn from a 9-ft. aisle into a 10-ft. bin!

Only by watching the TL-10 work can you fully realize the great savings you can make on bulk material handling. Let us arrange a demonstration NOW! Wire, write or call.

Added Versatility Standard bucket is quickly interchangeable with Lift Fork, Crane Hook, Dozer Blade or a 1½-yd. Light Materials Bucket. Each conversion adds to usefulness of the TL-10.



Write to us — for literature on the TL-10 and see your nearest Allis-Chalmers Industrial Tractor Dealer.

Never-Anywhere— A WHEEL LOADER LIKE THIS!

¾ cu. yd. bucket — weight 11,400 lb. — 63 brake hp. Has dynamic, new Allis-Chalmers POWER-CRATER engine . . . gives you high-octane performance on regular gasoline.

POWER-CRATER is an Allis-Chalmers trademark.

TRACTOMOTIVE

TRACTOMOTIVE CORPORATION, DEERFIELD, ILLINOIS

Tracto-Loaders • Tracto-Shovels, Side Booms and Hydraulic Rippers for Allis-Chalmers Crawler Tractors • Loader and Shoulder Maintainer for Allis-Chalmers "D" Motor Grader

Standard Alloys PLUS Heat Treating

COST 25-30% MORE THAN

ALMAG 35

ALUMINUM ALLOY

....which requires no heat treatment and has no residual stresses.

Hazards and expense of heat treatment are avoided when you use Almag 35 for high structural requirements castings. For Almag 35 requires no heat treatment and contains no locked-up stresses. It is the only light metal alloy which possesses all qualities* immediately upon casting.

SPECIFY ALMAG 35 — Reduce your casting costs 25-30% and eliminate Heat-Treat bottlenecks.

COVERED by U.S. PATENTS Nos. 2564044, 2628899, 2583474

* ELONGATION—14%
CHARPY IMPACT—10.47 PSI
YIELD STRENGTH—20,000 PSI.
TENSILE STRENGTH—40,000 PSI.

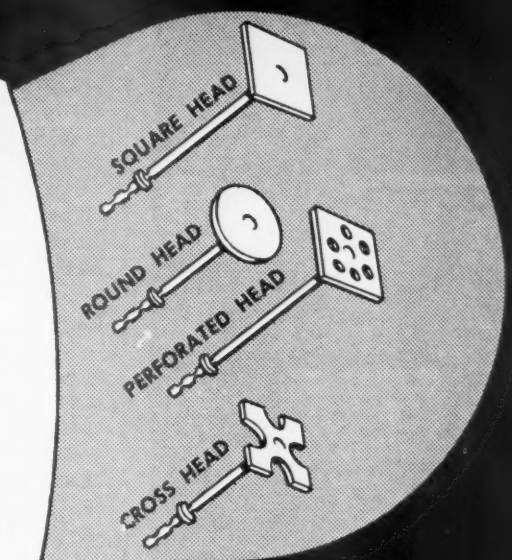
WILLIAM F. JOBBINS INCORPORATED

AURORA, ILLINOIS

P. O. BOX 230

MILWAUKEE RADIATOR CHAPLETS

give you an *EXTRA* measure of Quality



For Automotive Castings, Stove Castings, Radiator Castings, or when any light pressure high quality castings are desired, be sure to specify MILWAUKEE CHAPLETS and get the very best in shoulder radiator chaplets.

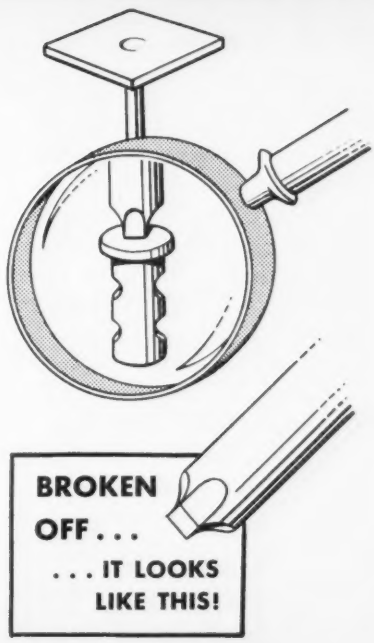
They're precision made of laboratory controlled materials by skilled craftsmen using the most modern manufacturing facilities. You get these outstanding advantages:

• Rigid Specifications • Burr-Less Construction • Clean Break-Off Nicks • Five Inspections • Best Materials for Easy Fusions • Large Dia. of Shoulder for Easy Seating • Thin Shoulders Mean Less Grinding.

NOT ONLY NEW BUT ALSO TRUE

A TRUE FOUR-WAY BREAK-OFF NICK!

Developed at the request of a large Automotive Company, this is a true four-way nick for easy break-off.



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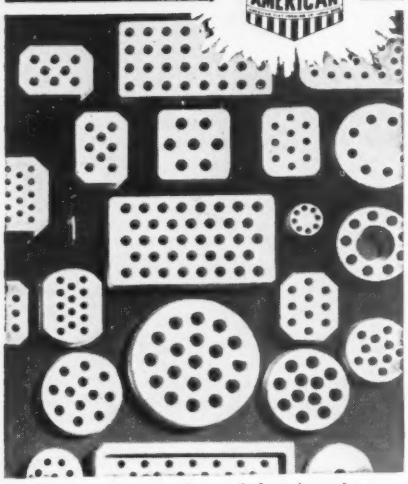

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Foundries all over the world are solving production problems with American Ceramic Strainer Cores. These foundries have fewer rejects too . . . because American Cores remain round and uniform during the pouring operation — slag remains on TOP of the core. The result? An evenly poured slag-free casting every time.

American will quote prices on any size or shape core . . . so write today for samples and descriptive literature. There's no obligation, of course.

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Manufacturers of Specialized Refractories for over 30 Years

READERS' COMMENT

Sound Pricing Essential

TO THE EDITORS:

This letter is prompted by our appreciation of your editorial "Controls Ahead" which appears in the July issue of FOUNDRY. We believe the great majority of foundrymen concur whole-heartedly with your editorial and that they are making a sincere effort to do a good job of sales promotion offering quality service and a fair price. Pricing of our product should be only a cost plus a fair profit basis, as you suggest.

In further reference to pricing, the writer is hopeful that the old-fashioned system of selling castings on a sliding schedule based on weight and quantity can be gradually eliminated and replaced by actual cost plus a fair profit basis. Certainly it is unfair to both producer and consumer to price on such a basis when everyone should realize that weight alone is not the determining factor, but such other factors as molding cost, design, kind of pattern equipment, cores, cleaning costs, etc., are all of the utmost importance in determining a fair price.

Let us in the foundry business attempt to promote a more sound basis of pricing in the future than we have had in the past.

R. G. ULLMAN
Sales Manager
The West Steel Casting Co.
Cleveland 3

* * *

Oil May Be the Cause

TO THE EDITORS:

With reference to the core sticking problem mentioned in the questions and answers section of the July issue of FOUNDRY on page 110, we believe that you have hit the nail on the head when you question the amount of moisture used in the core sand mixture.

However, we would like to add that the use of double-boiled linseed oil from ½ to 1 per cent in the Indian core sand mixture may be one of the major causes of trouble. Double-boiled linseed oil usually is viscous, and high viscosity binders promote stickiness. The terminology of boiled linseed oil does not infer heat treating but, rather, the addition of driers to speed up the oxidation of the material.

If the driers used were specifically for the paint trade, the double-boiled oil would tend to become sticky after mixing in the sand. This is because its siccative properties would be speeded up to such an extent that the film would become tacky during core manufacture, and the boxes would soon be covered with a film of partially oxidized oil; thereby adding to the stickiness problem.

O. JAY MEYERS
Technical Director
Foundry Products Div.
Archer-Daniels-Midland Co.
Minneapolis 2.

* * *

Suggests Galvanizing Inserts

TO THE EDITORS:

With reference to the question relating to casting-in steel inserts in gray iron castings which appeared on page 122 in the June issue under the heading "Inserts Must Be Clean and Dry," I have found that no difficulty is encountered if the insert is galvanized prior to use. This will save a great deal of time, and the inserts can be stored for a long time without any trouble.

E. K. SCHMIDT
Rust Engineering Co.
Birmingham 3, *Ala.*

* * *

Foundry Training Program

TO THE EDITORS:

Some time ago I received my copy of your publication, FOUNDRY, in which appeared the article about Unitcast Corp.'s training program. Needless to say, I was very pleased with the manner in which the program was described. It was accurate and to the point.

Again, let me express my appreciation to you for the excellent manner in which you presented our training course to the readers of your forward-looking publication.

ARTHUR R. SHANLEY
Director-Safety and Training
Unitcast Corp.
Toledo 9, *O.*

* * *

Detecting Porosity

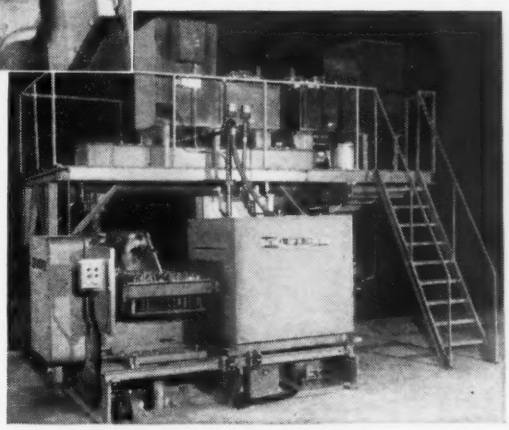
TO THE EDITORS:

Your article in the August issue of FOUNDRY entitled "Trouble Shooting" was of interest to me.

Our concern makes a very light, compact unit for testing the gas content of aluminum. The unit is called "The Porosity Detector" and sells for $179.95.

CHARLES BATCHELDER
President
Botsford Chemical Co.
Botsford, Conn.

Capable of producing forty 22 x 28 inch shells per hour, this unusual new single-station machine developed by Mechanical Handling Systems, Inc., of Detroit, incorporates a universal holder and stripper to fit any pattern. A cam lock release for ejector pins eliminates holder springs. An automatic mixer and gravity feed keeps the sand-resin mix level in the hopper, and curing oven rolls into position to surround the entire pattern for even curing.



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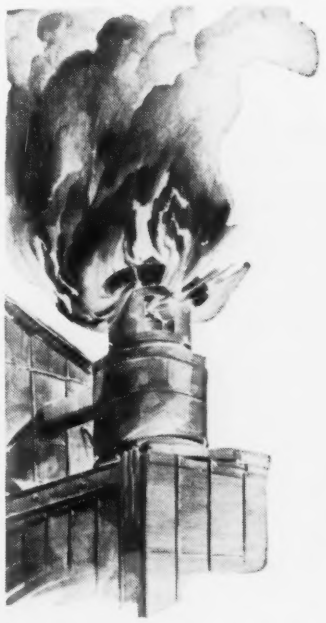
Silicone Insulation Saves $4500 in Rewind Costs; Outlasts Class A 36 to 1 In Core Oven Fan Motor



When the Lakey Foundry & Machine Co. installed an exhaust fan inside the top of their core oven stack, a resinous deposit quickly built up on the blades. Overloaded and unbalanced, the 7½ hp drive motor failed every 3 or 4 weeks. Almost inaccessible, it cost more to get it out of the stack than it did to rewind.

Then, three years ago the motor was rewound with Class H insulation made with Dow Corning silicones. New bearings lubricated with Dow Corning 44 Silicone grease were installed, and the motor was hoisted back into the stack. It has been operating steadily ever since with savings in rewind costs alone amounting to over $4500.

That kind of performance in installations all over the country proves that silicone (Class H) insulation has over 10 times the life of the next best class of insulating materials. It can also be used to increase the output of most motors by as much as 50%.

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This large malleable foundry has repeatedly ordered Sterling LS Flasks, some of which are shown in this picture.

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Modernize Your Thinking

Numbered among the business failures of the past are many companies which kept trying to sell a product after it had become obsolete. And yet the idea of making buggy whips in today's motorized age is no more incongruous than the attempt to market a modern product while using outmoded business and production practices.

Any industry—including the foundry industry—labors under a certain handicap if its origin is steeped in antiquity. Such a circumstance fosters resistance to change. The old charge that some foundrymen persist in using certain methods just because they were good enough in the past is not without some truth, although it is far from being representative of the industry as a whole.

Another mistaken notion that can lead to trouble is the belief that the use of castings for certain applications yesterday assures their retention in tomorrow's market.

There have been times when foundries could get away with a hit-or-miss cost system, indifferent sales efforts, careless supervision of plant operations and wide variations in quality of castings produced. Things are different today, and the competitive situation that gives indications of being with us for an extended period should prompt every foundryman to scrutinize closely not only his plant facilities and production practices, but also his marketing methods.

It's time to throw out guesswork and replace it with scientifically proved techniques. With all the information developed in recent years concerning control of the many variables affecting the quality of castings, there is every reason why cast products should earn a reputation for consistent dependability.

It's also time for foundries to intensify their efforts in product development work. True, the demand for castings depends largely on the volume of business for manufactured goods of which castings are components. Nevertheless, it has been demonstrated that new and sizable markets can be created by seeking out products which logically should be made by the casting process and then doing a convincing selling job.

There are no figures to prove it, but it is likely that more foundry organizations have been unsuccessful because they neglected to modernize their thinking than because they failed to modernize their plants.

William G. Reed

Managing Editor

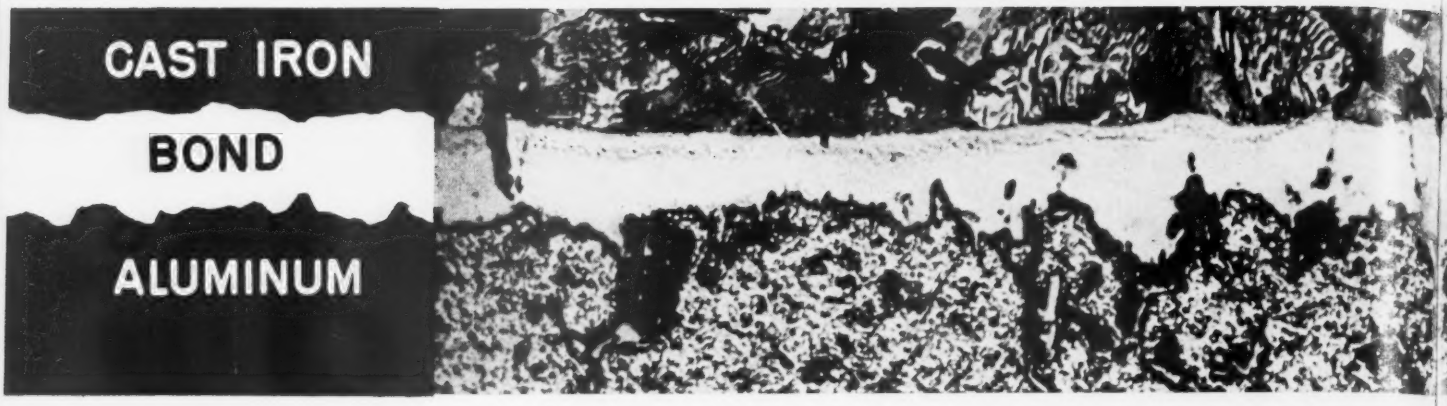


Fig. 1—Photomicrograph shows Al-Fin bond between cast iron and aluminum.

BIMETALLIC CASTINGS

Achieved by Bonding Process

By VINCENT DELPORT
European Manager

DURING the war, over 50,000,000 aircraft piston rings and 1,500,000 aircraft pistons, in addition to a vast quantity of other components were produced by Wellworthy Ltd. The company specializes in the manufacture of piston rings, which it has been making since the early days of the internal combustion engine. Some time ago it extended its production to include pistons, cylinder liners, airplane engine castings and a variety of other components. In 1918, the company was operating in a workshop at Lymington, near Southhampton; now, it has four large factories and employs approximately 4000 people. Today, this company is supplying a large number of engine builders with pistons, piston rings, cylinder liners and many other components.

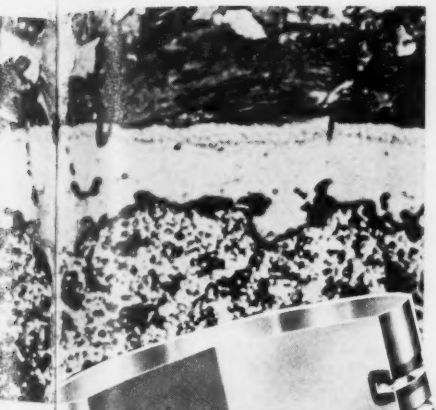
The firm is noteworthy for the introduction 35 years ago of its process of internally hammering piston rings on a special machine which gives perfect shape to the rings.

For many years, automobile and airplane engine designers tried to obtain optimum mechanical properties with minimum weight by combining iron or steel with lighter metals or alloys. Mechanical methods of jointing by shrink fitting or otherwise gave rise to many shortcomings. Wellworthy technicians worked on the problem and solved it in 1946 by a metallurgical process, essentially a foundry operation, know as "bonding." When application for patent was made, it was discovered that a patent had been issued to the Al-Fin Division of the Fairchild Engine & Airplane Corp., Farmingdale, Long Island, N. Y., which had solved the problem along parallel lines, and had operated the process under security regulations during the war years. In June 1948 Wellworthy obtained a license for the manufacture of bonded bimetallic components in the United Kingdom under Fairchild patents.

The main difficulty that had to be overcome in bonding aluminum and its alloys to ferrous metals was the formation of the nonmetallic oxide film on the surface of the light alloy. This difficulty now has been solved, and successful chemical bonding of aluminum and its alloys to ferrous metals, either plain or alloy, has been achieved. Thus, engineers are in a position to combine the hardness, fatigue strength and impact resistance of cast iron and steel with the low density and high thermal and electrical conductivity of aluminum. The joint between the ferrous and aluminum members, an example of which is shown in Fig. 1, consists of an alloy of iron and aluminum of an approximate chemical composition of $FeAl_3$. It is not possible to bond directly onto nitrided or carburized surfaces without the use of special methods.

The bonding process is essentially one which takes place during fabrication of a bimetallic component, and bonding is achieved during the casting process which forms the alloy component.

As an example of the sequence of operations, the bonding of the top ring groove in a diesel en-



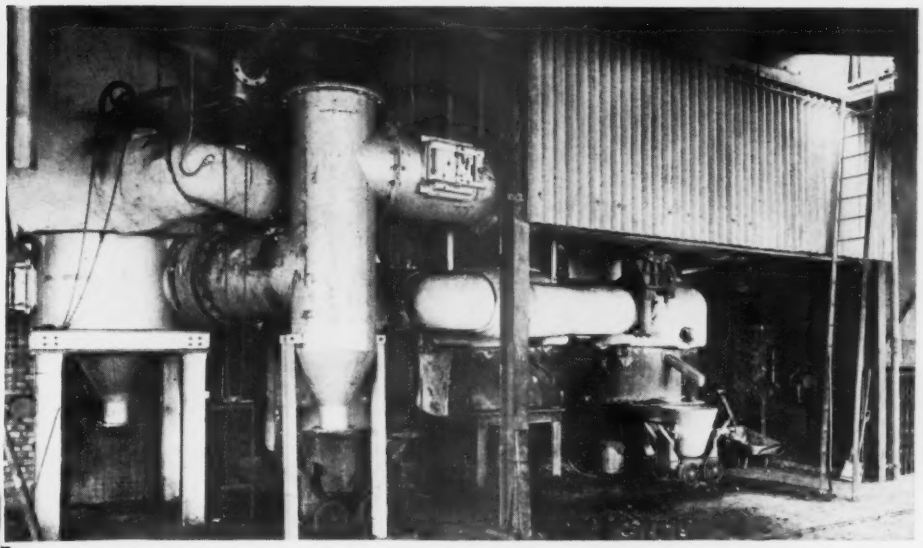


Fig. 3 (above)—Iron is melted in hot blast cupolas. Blast air is heated as it circulates around the container shown and goes to the air belt

Fig. 2 (left)—A view of the finished diesel piston shows how top groove in iron (shaded portion) forms integral part of the aluminum alloy piston

Fig. 4—Metal is drawn from cupola into ladles and then is carried by overhead rail conveyor to three 300-kw electric rocking holding furnaces, each of 3000-lb capacity

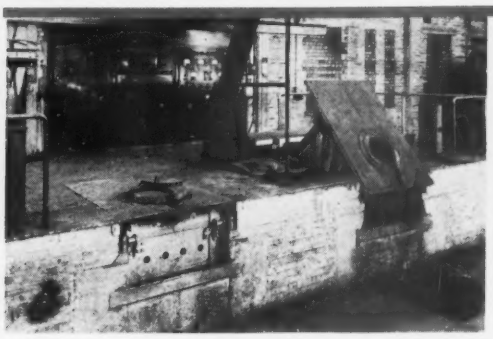


Fig. 5—High frequency induction furnaces used for alloy cast iron

Fig. 6—Operators pouring metal into centrifugal casting machine

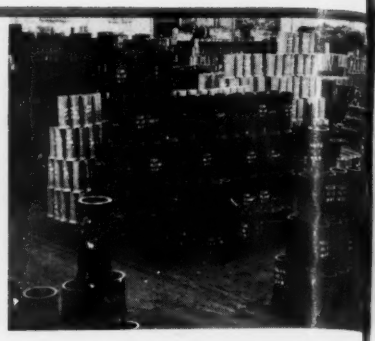


Fig. 7—View of castings stockyard shows markings on the pots

Fig. 10—Currently 30 bail-out furnaces are operating, and 30 more are being installed

gine piston has been selected. Fig. 2 shows the finished part, the top groove in iron (shaded portion) forming an integral part of the aluminum alloy piston.

The iron inserts are cut from cylinders or "pots" made of centrifugally spun austenitic cast iron (Ni-resist) which has a high coefficient of thermal expansion nearly approaching that of the aluminum alloy from which the body of the piston is made.

The pots, as well as cylinder liners and other cylindrical parts, are made at the firm's centrifugal foundry at Ringwood, a few miles from the aluminum foundry of Lymington. The Ringwood centrifugal foundry is one of the most up-to-date of its kind in the country.

Owing to the diversity of products made, six grades of pig iron are used, and, by the addition of alloying elements, some sixteen alloys are available. A tensile strength of as much as 78,400 psi is obtained with an iron alloy which contains chromium and molybdenum.

Iron is melted in two hot blast cupolas of 4½-tons-per-hour capacity, which are operated alternately. In these cupolas, gases are collected at the top of the furnace and are conducted to a container, where they are mixed with secondary air and fired at approximately 2030° F, dust from the gases being collected on the way. The blast air is heated as it circulates around this container and goes to the air belt (Fig. 3). As a result, the atmosphere is not polluted and coke consumption is cut, or, alternatively, the same amount of coke will give hotter metal if required.

Normally made up of 50 per cent pig iron, 40 per cent cast iron scrap and 10 per cent steel, charges are brought up to the cupola platform by electric lift.

Metal is drawn from the cupola into ladles and taken by overhead rail conveyor (Fig. 4) to a battery of three 300-kw, electric rocking, holding furnaces, each of 3000-lb capacity. These furnaces can be used for holding different metal mixtures, but normally they allow time for alloying and cleaning in one furnace while drawing from another. The metal is held at a temperature ranging from 2460 to 2550° F, and the temperature of the furnaces is manually controlled.

A fourth holding furnace, oil fired, also is used for better distribution of the metal when all centrifugal casting machines are in use. For the preparation of high (*Please turn to page* 212)

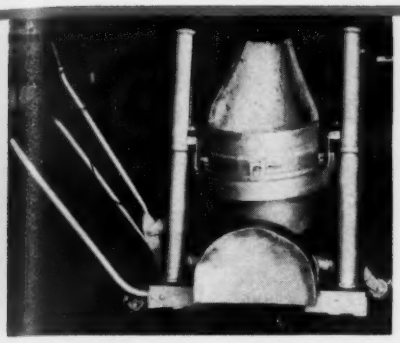


Fig. 8—Metal is carried in specially designed hydraulic ladle

Fig. 9 — Hydraulically controlled lift is used to pour metal into a bail-out furnace. Ladle is carried on trolley

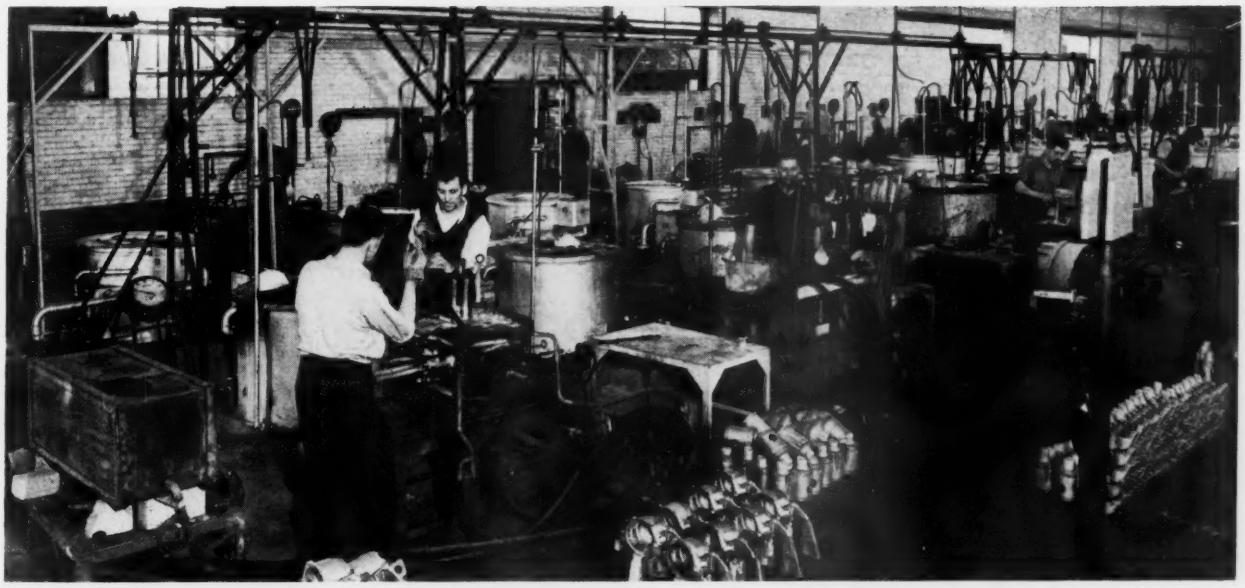


Fig. 11—Further view of bail-out furnaces. Each has its own temperature recorder. Supplementary ingot metal is added to primary molten metal from the rotary furnace

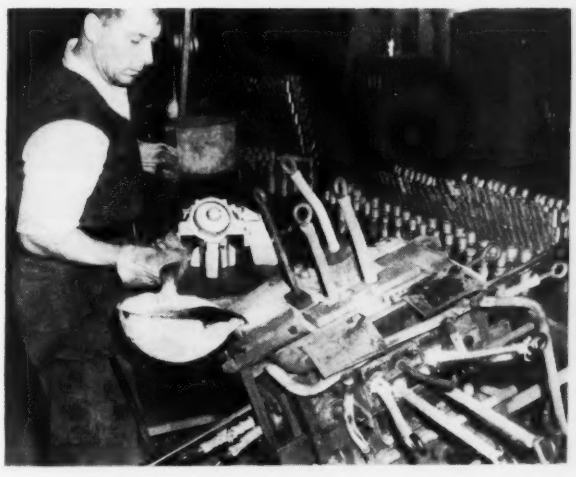
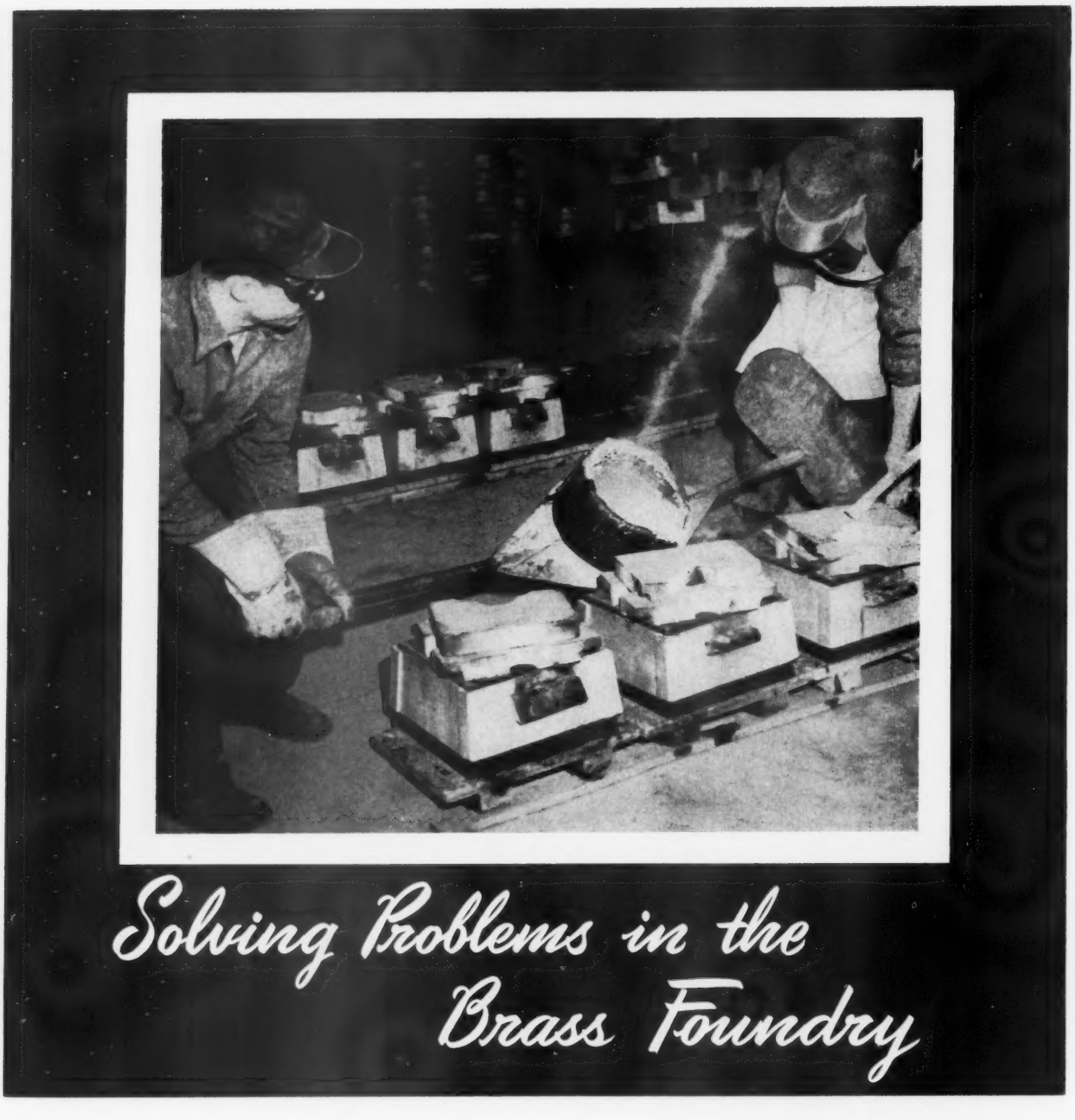


Fig. 12—A number of these permanent molds are located behind the bail-out furnaces

Fig. 13—Iron piston ring groove insert is removed from precoating bath before being cast into piston

Fig. 14—Iron ring is transferred to permanent mold, and alloy is poured while bond layer still is in molten state. After casting has solidified and is ready for removal, like this one, ring is an integral part of it



Solving Problems in the Brass Foundry

Increasing customer demands for higher standards of quality in castings require improved foundry procedure in order to avoid rejects. In this article, first of two, the author describes how to make better castings

IN THESE days of increasing demands by customers for higher standards of quality in castings, a natural result is an increase in the percentage of defectives until foundry procedure reaches the new, high level of today's requirements.

In the endeavor to reach the new standard, the first requirement is a long range view of the foundry as a whole. This fact suggests that a member of management should leave his own foundry and visit others. Upon returning he will have a certain freshness of view that will enable him to see previously overlooked weaknesses. To take a homely example, assume that a barrel is standing in the center of a passageway. If the first time one comes upon it he just walks around it and proceeds on his way, he is likely to do so the second time and soon assume, subconsciously, that his procedure is correct. Someone with an outside approach comes along and says, "For goodness sake, keep that barrel out of the gangway!" Then the remedy is applied quickly and easily.

The second requirement for solving trouble is to alter only one step in production at a time, and it is desirable that this one step be fundamental to the success of the operations that are involved. The alternative is to make several alterations in the hope that one or more of them will be the right corrective. If you are lucky enough to succeed,

you are also unusually fortunate, but you will not really have solved the problem because you cannot tell which of the changes or combination of changes was the one needed. One has never really mastered a problem until it can be varied at will.

The exception to the foregoing is an instance when it is obvious that a number of operations are being conducted in a basically wrong manner. This situation should not exist in any well run bronze foundry. If such a condition does prevail, however, it is clear that all such errors should be corrected as soon as possible. Such troubles as exist after this then should be tackled by making only one change at a time.

Let us start our investigation of casting troubles by assuming that a particular foundry is in a desperate condition. In such a case the metal purchased from which castings are to be made is likely to be miscellaneous scrap purchased on the open market from scrap dealers. In the old days segregation of scrap by hand sorting was fairly effective, for only a few alloys were in vogue; but even then there were at least two yellow metal alloys, brass and manganese bronze. Manganese bronze, with its aluminum content certainly was inimical to the production of pressure-tight castings made of leaded tin bronze.

In addition, few machine shops pay really careful attention to keeping the various alloys separate, so that by the time turnings have passed through the hands of a scrap dealer and have reached the foundry user, the stage is all set for casting trouble. With the advent of new alloys such as aluminum and silicon bronze, the sorting of scrap has become more difficult and its use by foundries more and more dangerous.

By HAROLD J. ROAST
Bronze Foundry Consultant
Ottawa, Canada

Where "scrap" means only defective castings, with their gates, sprues and risers, with or without turnings, derived solely from the machining operation, the argument against "scrap" does not apply, providing that the very great care needed to keep each kind in a place by itself is maintained. However as a matter of safety first, the first change to institute in such a foundry is the substitution of composition ingot for scrap.

The second point requiring study is the sand used. Is it the best sand for the work in hand? The foundry sand may be natural, clay-bonded sand used as green sand, or dry sand, or it may be so-called synthetic sand.

The third point to be investigated is the kind of melting units employed. Regardless of which type is used, any or all have to be studied carefully, for each has it peculiar characteristics. Here the important points to be considered are speed of melting, nature of furnace atmosphere (oxidizing being desired for all but electric), facility for charging and wear and tear on lining.

The fourth item calling for attention is the method of pouring, including condition of the ladles used and their preheating. Cold ladles and ladles with dirty linings are anathema.

Working conditions are the fifth matter for consideration. They are not put first because if this foundry is in a "desperate condition," as has been assumed, the first thing to do is to make some better castings under the working conditions pertaining, no matter how bad these may be. To get permanent improvement, however, the foundry should be made "a pleasant place in which to work." This requirement means freedom from noxious fumes, noise and overcrowding, of either men or machines, and establishment of comfortable temperatures during the entire year.

The sixth area to be considered is the incentive provided for the foundrymen. Are wages adequate? In these days of union activity they probably are. What incentive is there along the line of bonuses or piece work? Is publicity given to improvements obtained both by groups such as melters and molders and by individuals, by making public the identity of the man or group that achieves them? We all like to have our names appear for others to see, providing the association is a good one. More will be accomplished by publicizing the good rather than the bad. A careless employee may, by this means, be made more careful without actually drawing undue attention to his shortcomings.

If these important fundamental points are brought up to some better standard, the foundry will probably have been carried out of the "desperate" class. This being so, we can carry on our endeavor for further improvement, considering that we are now dealing with an average American nonferrous foundry.

Let us suppose that trouble develops, such as leaks under hydrostatic pressure in tin bronze castings. The starting point is the pattern from which the casting is to be made. The pattern may be designed incorrectly in regard to such matters as re-entrant angles or too abrupt variation of cross-section. In many cases the foundry has no access to the designer and feels that if at all possible, it should use the pattern essentially as it is. The sharp angles may be dealt with to a certain extent by the molder as he makes his mold. The abrupt change in cross section may be ameliorated by the judicious use of risers and chills. In some cases, casting temperature and rate of pouring may overcome the difficulty.

If it is considered that the pattern is satisfactory, the second process to study is the melt quality. Melt quality means not only chemical composition with special reference to impurities, but also the presence of an undue amount of oxides and/or gases, principally hydrogen. Presumably the chemical composition of the original ingots is already available, but there still remains the possibility of impurities that may (*Please turn to page* 222)

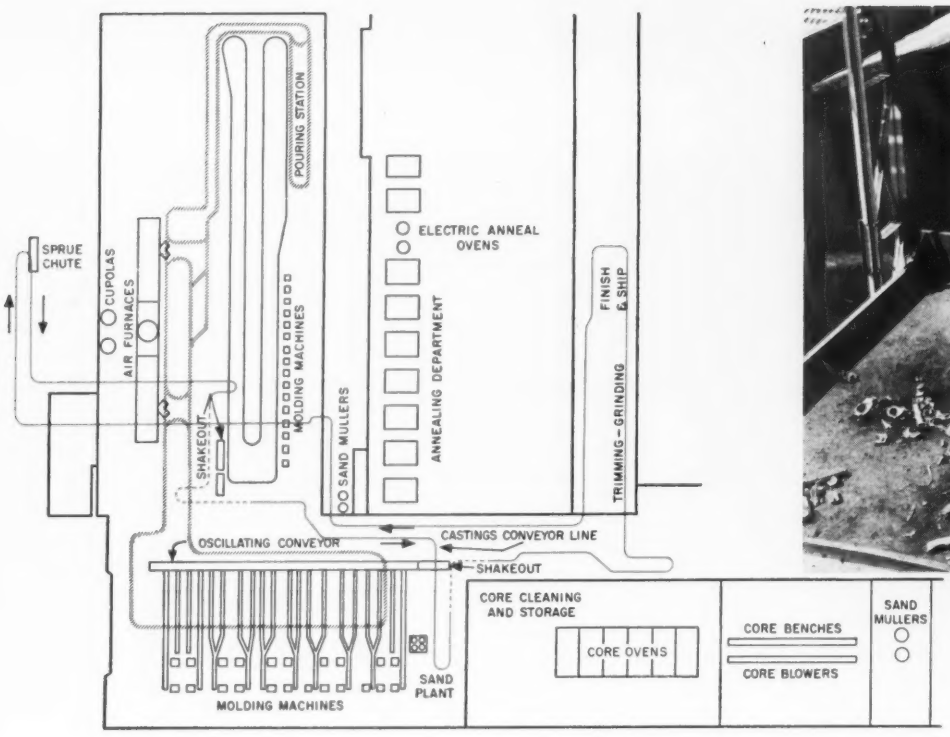


Fig. 1—Diagram shows layout of plant. Gray loop is overhead tramrail system which transports molten metal, and color is castings conveyor

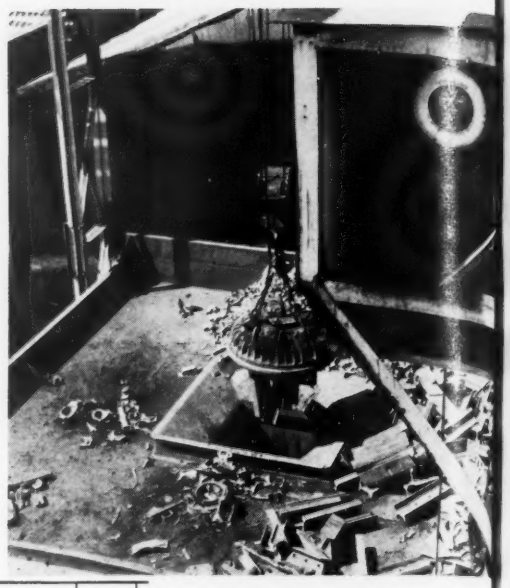


Fig. 2 — Metallic components are picked up by a magnet suspended from a crane and discharged into cone-type buckets of drop-bottom type, which are raised to cupolas and dumped

MALLEABLE FOUNDRY *Modernizes Facilities*

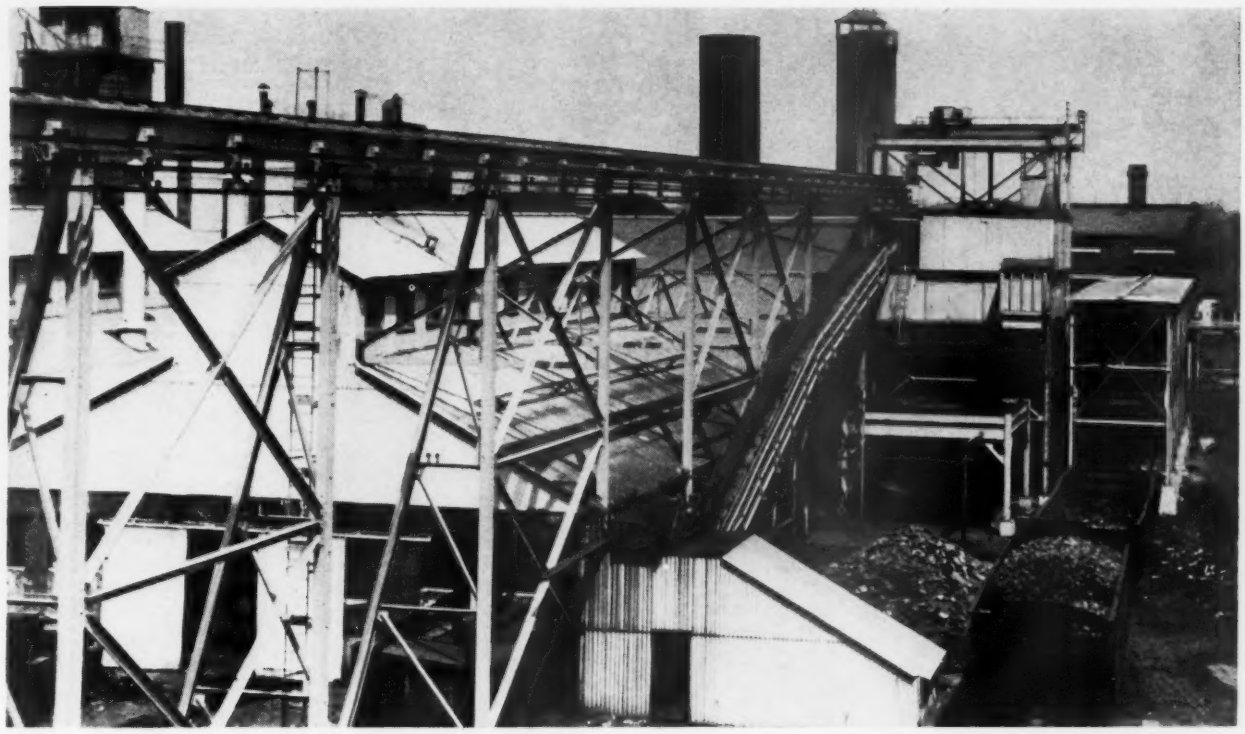
By EDWIN BREMER
Metallurgical Editor

SEVERAL years ago, Marion Malleable Iron Works, Marion, Ind., a subsidiary of Chicago Railway Equipment Co., Chicago, began a modernization of facilities to reduce worker fatigue to a minimum and thereby to improve production. The total program involved extensive changes in melting and molding procedures as well as a considerable expenditure. It therefore was deemed advisable to proceed on an orderly, step-by-step basis to eliminate interference with production as well as to gain the advantage of cost savings effected by one improvement for application to starting and carrying on another.

One of the first steps was the substitution of duplex melting for cold-batch air furnace melting. As indicated in Fig. 1, the installation is comprised of two 90-in. ID cupolas and two 35-ton pulverized-coal fired air furnaces located at the east end of the foundry. Cupolas are used on alternate days, and the air furnaces are run about 18 to 20 days before being taken out of service for repair of the bottoms. Side wall life is about 5 weeks. Each cupola is equipped with a forehearth which delivers molten iron to either of the air furnaces in operation.

All raw materials for the cupolas are analyzed and segregated in the storage yard to facilitate charging. Metallic components are picked up by a magnet suspended from a crane (Fig. 2) and discharged into cone-type drop-bottom buckets which are raised and dumped into the cupolas.

Cupola charges weigh 4000 lb and are composed of about 9 per cent silvery pig, 4 per cent malleable scrap, 38 per cent steel scrap and 49 per cent home



View of exterior of Marion Malleable Iron Works features storage yard. Castings conveyor and sprue chute (See Fig. 1) are in left foreground

scrap. Coke to iron ratio is 1 to 8.5. Molten iron from the cupola is desulphurized in the forehearth with the addition of 2.9 lb of soda ash per ton of metal. Test specimens are taken from the cupola iron every hour and analyzed for carbon, manganese, sulphur and silicon.

Extremely close control is maintained on the air furnace operation to obtain efficient combustion conditions which will result in the most favorable composition and temperature of the iron. Combustion is controlled by a combustion analyzer instrument. Hourly samples of the furnace atmosphere are withdrawn through water-cooled tubes located over the bridge wall of the furnace. These samples go directly into the instrument, which determines electrically the amount of oxygen and combustible matter present. Operations indicate that excellent results are obtained when the furnace atmosphere shows 0.5 per cent oxygen and 0.25 to 0.5 combustible material. Metal temperatures are taken at the time the gas readings are made, at approximately the same positions of the sampling tubes. Use of the instrument has enabled the firm to hold pulverized fuel consumption at 150 to 175 lb per ton of metal, providing a saving of 20 to 30 per cent, and still to maintain satisfactory metal tem-

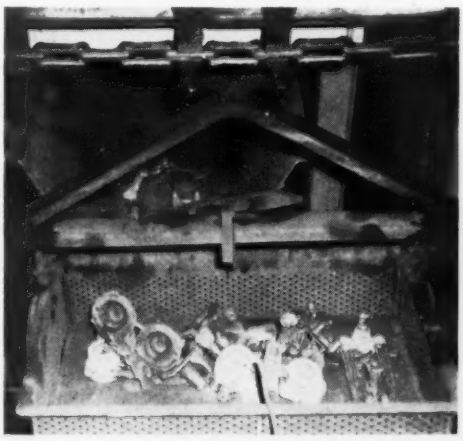
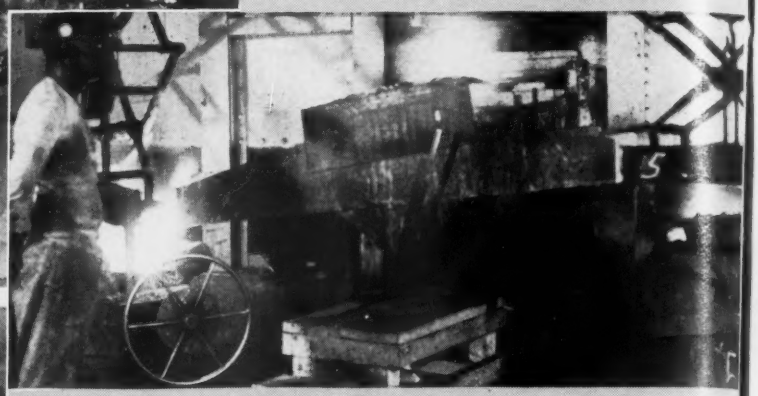


Fig. 3—Castings are fed to perforated steel buckets to be transported to cleaning and annealing department

Fig. 4—Car-type molding line conveyor line is enclosed completely in a sheet metal structure, and a powerful exhaust system is used to remove smoke and fumes from the enclosure

Fig. 5 (left)—In pouring area tops of molding line conveyor cars are at level of the floor

Fig. 6 (below)—Air furnace has a bifurcated spout attachment



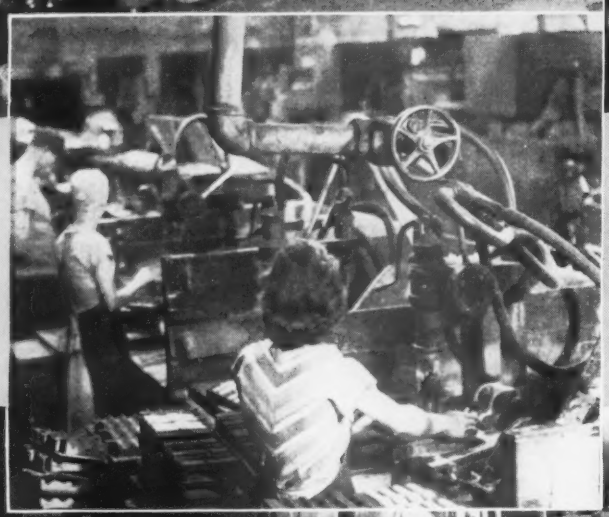


Fig. 7 (left)—Cores in a wide variety of shapes and sizes are produced on the bench and with core-blowers in well lighted core department shown here

Fig. 8 (below)—Sand for cores is mixed in either of two 1000-lb capacity mullers which are totally enclosed to prevent the escape of light materials

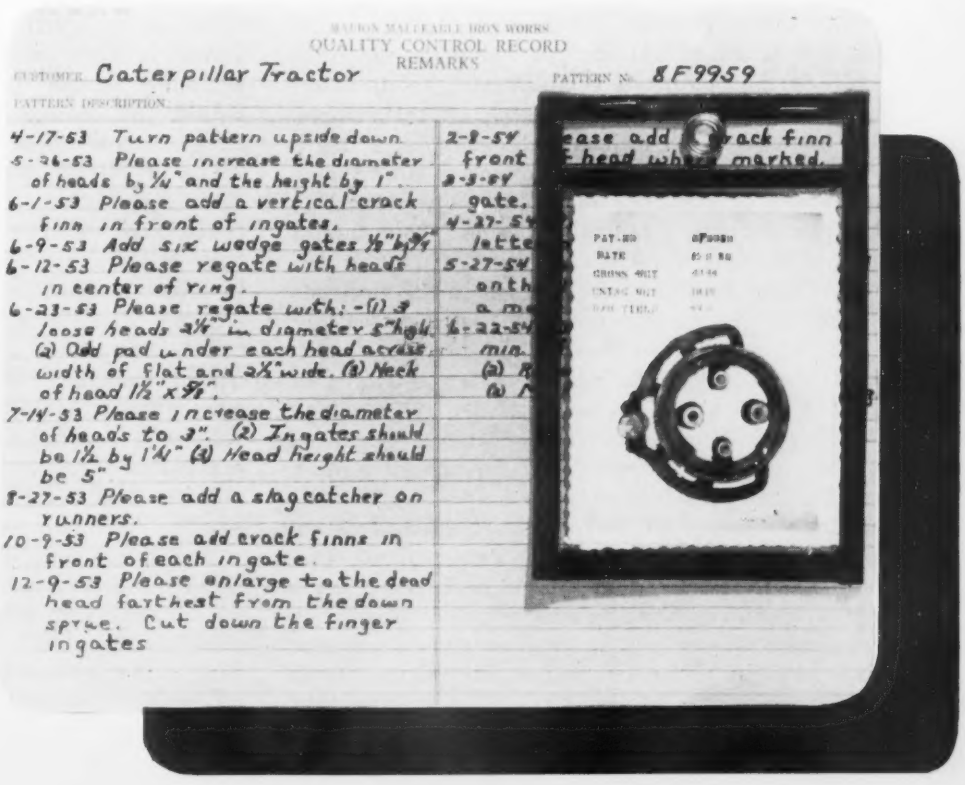
perature and composition in daily operation.

Additional controls to insure quality iron from the air furnace include pouring of "plugs" 7 in. long and 2 in. in diam every 30 minutes. Those are broken, and the fractures are examined for structural appearance. Every half-hour, specimens are sent to the laboratory for determination of carbon, manganese, sulphur and silicon contents, and every hour the chromium content is determined. Fluidity spirals, four tensile bars and bars 7 in. long and $\frac{7}{8}$-in. square are poured every hour. The latter are placed in annealing pots with the castings and after heat treatment are fractured for examination of the structure. In addition to the duplexing units for production of grade 35018 malleable iron (35,000 psi yield strength, 18 per cent elongation, 53,000 psi tensile strength), the firm also operates two electric ovens of 1-ton and 5-ton capacity for production of pearlitic malleable iron.

Another step in the modernization program was installation of a "roll-out" molding production line, shown at lower left in Fig. 1. This unit occupies an area about 180 ft long and 104 ft wide. Molding machines are located in two rows about 16 ft from the north wall of the building, and the roller conveyor lines extend approximately 42 ft south to an oscillating apron type conveyor. Three roller mold conveyor lines on the east end are arranged to carry molds on pallets or long bottom boards with the long dimension perpendicular to the line of travel of the conveyor. First two of the pallet lines carry three molds, and the third holds two molds. West end of the roll-out unit also carries a 3-mold pallet, and the area between the pallet lines contains roller conveyor lines carrying single molds.

Molds for the pallet and conveyor lines are produced on 20 molding machines arranged in cope and drag pairs as shown in Fig. 1. Machines are located adjacent to an underground pit or passageway housing a long conveyor belt. Passageway is covered with open-grid plates which permit spill sand from the machines to fall onto the belt, which carries it to either of two 150-ton storage tanks at the west end of the building. Sand from those is discharged into either of two sand mullers in 2400-lb batches. Mullers are equipped with web-type dust collectors. Additions of 5 to 6 per cent southern bentonite and a similar amount of sea-coal with sufficient moisture to bring the content to 2.8 to 3.2 per cent are made, and the batch is mulled for three minutes.

Additions of sand and moisture are controlled automatically by equipment which includes a sand measuring hopper, water storage tank, timer and control instruments. Measuring hopper is equipped with electrodes to measure the moisture content and a mercury bulb thermometer to ascertain the temperature. Those data are transmitted to the control instrument, which correlates them and then admits the proper amount of water, as predetermined by a setting of a dial, into the storage tank. In this operation, the man in charge of sand mixing switches on the timing device, which in turn admits the proper amount of sand into the measuring hopper and the correct amount of water into the storage tank, then discharges both into the muller. After a predetermined mixing cycle, the timer opens the gate and permits the machine to discharge the sand. Then the cycle of filling the hopper, etc., is repeated. Prepared sand from the muller is elevated to a conveyor belt which distributes it to the sand hoppers over the molding machine line. Sand tests are made hourly to insure that moisture content, permeability and green strength are within (*Please turn to page* 274)


MASON MALLEABLE IRON WORKS
QUALITY CONTROL RECORD
REMARKS

CUSTOMER Caterpillar Tractor PATTERN No. 8F9959

PATTERN DESCRIPTION:

4-17-53 Turn pattern upside down.
5-26-53 Please increase the diameter of heads by ¼" and the height by 1".
6-1-53 Please add a vertical crack finn in front of ingates.
6-9-53 Add six wedge gates ½"by¾"
6-12-53 Please regate with heads in center of ring.
6-23-53 Please regate with: -(1) 3 loose heads 2¼" in diameter 5" high (2) Add pad under each head across width of flat and 2¼" wide. (3) Neck of head 1½" x 5½".
7-14-53 Please increase the diameter of heads to 3". (2) Ingates should be 1¼ by 1¼" (3) Head height should be 5"
8-27-53 Please add a slag catcher on runners.
10-9-53 Please add crack finns in front of each ingate.
12-9-53 Please enlarge to the dead head farthest from the down sprue. Cut down the finger ingates

2-8-54 ease add rack finn front head wh marked.
3-3-54 gate.
4-27-54 lette
5-27-54 anth a m
6-22-54 min. (2) (3)

Fig. 9—As an aid to control of melting and other operations the laboratory keeps a file card for each casting which reports the complete data relating to production procedure from time it is placed in sand

By LESLIE E. HARPER
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SPECTROGRAPHIC ANALYSIS of Foundry Metal

The direct reading spectrometer makes it possible to obtain accurate analyses of metal from cupola or electric furnace within five minutes after a sample is taken. Here's how it works

QUALITY control for Campbell, Wyant & Cannon Foundry Co. demands that the foundry be supplied with accurate analysis of the metal from the cupola or electric furnace at the earliest possible moment. The direct reading spectrometer makes this possible; through its use in the analytical laboratory the metal analysis is available within five minutes after the sample is taken.

The direct reading spectrometer, as its name implies, is an instrument that converts the light from burning electrode samples into recorded percentages of the elements making up the sample. If, between the two electrode samples a high-voltage discharge is made to occur, appreciable quantities of electrode material are vaporized in the gap and give a radiant emission. This radiant energy is made up of a composite of light of different wave lengths—each element in the electrode sample having its own group of wave lengths.

For example, if the element silicon were present in the electrode, light having a wave length of 2881.578 A° would be present; also its intensity would be a function of the precentage of silicon present in the electrodes. In the direct reading spectrometer the high-voltage source supplies the electrical energy for the spark and light emission between the electrode sample. This radiant emission from the electrode sample is focussed on a concave grating which breaks up the light into its component wave lengths or spectrum lines. For each element to be determined, an exit slit is so positioned at the focal point of the grating that it allows light from the element spectrum line to pass through the slit and fall on the cathode surface of a photomultiplier tube. This tube has the unique property of transforming light of a wide range of intensities and wave lengths to electrical energy and in the process multiplies this energy several hundred thousand times.

During the exposure, or sampling period, the electrical energy from the photomultiplier tubes is stored in condensers, allowing a relatively long sampling period. At the start of the measure period, the voltage from the condensers is fed to an electronic amplifier which in turn energizes a series of relays, causing an electric clock to run. The length of time the clock runs is dependent on the amount of light falling on the photomultiplier tube (energy stored in the condensers) and this in turn is related directly to the percentage of the element in the sample.

The Baird-Dow direct reading spectrometer in use at Campbell, Wyant & Cannon Foundry Co. since 1949 is calibrated for the elements over the following percentage ranges: Silicon 0.05—3.00, manganese 0.10—2.00, Chromium 0.05—3.00, Nickel 0.05—2.00, Molybdenum 0.05—2.00, Copper 0.10—3.00, Vanadium 0.05—0.30.

The instrument is calibrated and arranged so as to be direct reading for these elements in cast steels, gray and alloyed irons from cupolas, electric furnaces and converters. The percentage ranges of the elements just listed cover the composition of a wide range of castings, i.e., engine

Fig. 1—Spectrometer samples are cast in split or book type molds

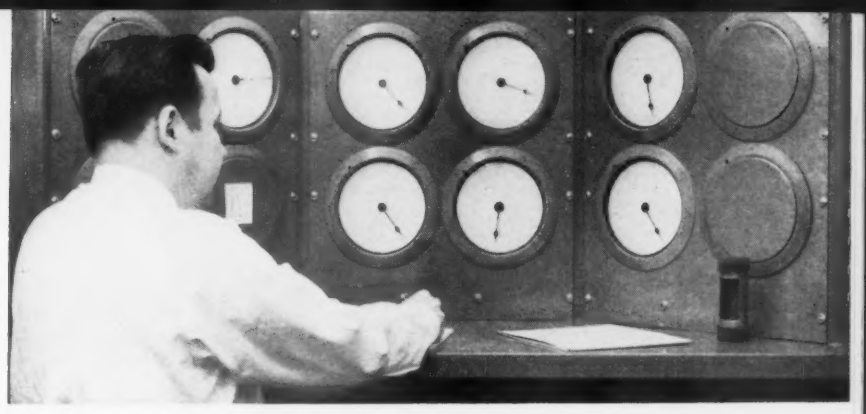

Fig. 2—After switch is contacted, instrument carries out all operations automatically in 30 seconds, and results are read from clocks

blocks, heads, gears, camshafts, crankshafts, manifolds, liners, housings, etc.

Samples for the spectrometer are prepared by casting in split or book type molds, Fig. 1. Investigation pointed up the necessity of having all the carbon in the sample in the combined form for reproducible results. To achieve this the mold was designed with a 5/16-in. section between the pouring trough and the 7/32-in. sample; this section prevents the heat from the relatively massive pouring trough from being transferred to the upper end of the sample pins and exerting a graphitizing action.

The laboratory receives the samples from the melting floor through pneumatic tubes. In the laboratory the technician prepares the pins by grinding the ends to a 150° included angle, an operation that takes only ten to fifteen seconds. The pins are placed in the spark holder of the direct reader, spaced accurately by a built-in spacer, and then the switch is contacted. During the next thirty seconds the instrument carries out all operations automatically and at the end of this period the results are read from the clocks (Fig. 2).

For optimum accuracy the other ends of the same pins are sparked and the average of the results reported back to the melting department by means of a telautograph. In this manner one technician can handle 150 samples in nine hours, which if all seven elements are read amounts to over a thousand determinations. The same amount of work performed by usual chemical methods would take well over one hundred man-hours.

Once every hour a master standard, which has been standardized by chemical methods, is analyzed by the direct reader and the results compared; thus any deviation from the normal error is noticed and is corrected. During the past year some one-thousand chemical checks for silicon were made and the results compared with those of the direct reader. Silicon was chosen because it is perhaps the most difficult element to determine in the spectrochemical analysis of cast irons. Ninety-six and one-half per cent of the direct reader's results fell on or within ± 0.05 per cent of the chemical result. Results of chemical checks made at random on the other six elements are shown in the accompanying table.

These results are based on the premise that the chemical results were void of error; needless to say this is not true. However, the chemical methods used in many cases were umpire methods and were checked for reliability by carrying a U. S. Bureau of Standards sample of like composition along with the test in question. In all cases use of the direct reading spectrometer gave as reliable results as those of routine chemical procedures. In some cases, such as the determination of small amounts of nickel in the presence of large amounts of copper, the direct reader results are more trustworthy.

The spectrometer, being a formidable collection of optical and electronic parts, is subject to breakdowns. Our down time over the last four and one-half years has amounted to less than three hours per year with half of this time being represented by having only the equipment for one element out of use.

Optical stability is achieved by mounting all optical parts on a massive steel "A" frame which rests on a three-point kinematic mounting, with the entire instrument room being air conditioned. For every element there is a channel consisting of an amplifier drawer and a relay drawer which are plug-in units that are interchangeable; thus much of the trouble can be located in the matter of minutes by substituting an amplifier or relay drawer known to be in good working order for the one in question. Other relays and switches that may give trouble are also of the plug-in type.

The application of the direct reading spectrometer in the foundry control laboratory has made it possible more economically to produce castings with a greater uniformity of desired composition.

Results of Chemical Checks

Element	Number of Samples	Concentration Ranges, %	*Coefficient of Variation, %
Silicon	1,142	1.52-3.00	1.10
Manganese	211	.35-1.88	1.26
Chromium	134	.08-1.96	.95
Nickel	75	.17-1.75	.90
Molybdenum	159	.07-1.63	1.11
Copper	63	.09-2.17	1.03
Vanadium	24	.07- .31	.98

*Coefficient of variation = standard deviation ÷ average of chemical results. Standard deviation = $\sqrt{Ed^2/n}$ where d = difference of D.R. result from chemical result, n = number of determinations.

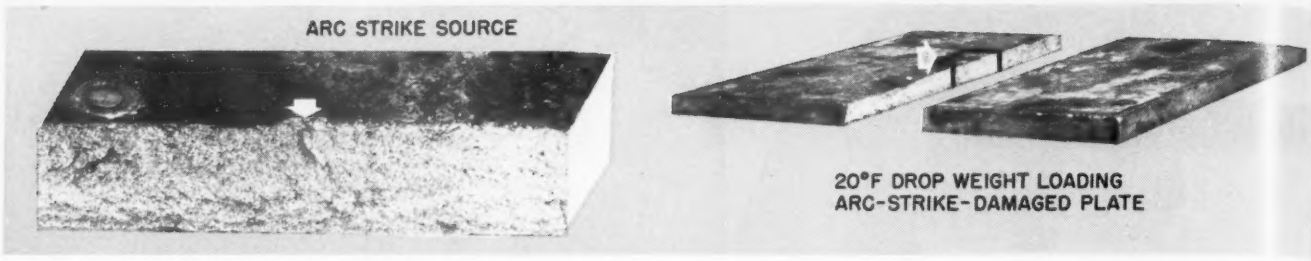

Fig. 1—Performance of commercial structural steel plate 1 x 20 x 20 in. in notch free condition (bottom) and in presence of small cracks caused by arc strike (top)

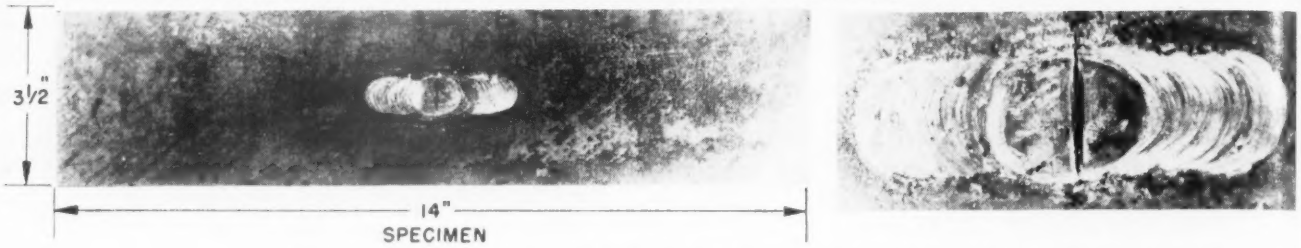

Fig. 3—In the drop weight test, a brittle weld is notched with a rotating abrasive disc to facilitate cracking. Note weld crack in specimen which resisted fracture

Notch Ductility of

Notch ductility is an important factor in decisions relating to many applications. The drop weight test provides a simple means of measuring and insuring this property for the most severe notch conditions expected

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METAL parts generally fail in nonductile fashion; failures involving extensive deformation are quite rare. Until relatively recently, the unexpected, nonductile failure of metals which show good ductility in tensile tests caused considerable confusion regarding the significance of tensile ductility. It now is appreciated generally that ductility as measured by tensile tests is significant only for conditions of service entailing smooth, notch-free surfaces—that is, conditions equivalent to those of the tensile test bar.

Brittle fractures in service generally result from the presence of notches. Ordinarily, notches of various types are present in structures and machinery components. Such notches may be design features (notches, threads, keyways) or defects (grinding or quench cracks, shrinkage or hot cracks in castings, weld flaws, etc.). Consequently, it is necessary to evaluate the ductility of metals not only by tensile tests, but also by various tests entailing the presence of notches. Fig. 1 presents results of tests on a large plate of structural mild steel which clearly demonstrate the damaging effects of small cracks for a common material used in large tonnages. Chemical analysis of the metal is 0.23 per cent C, 0.41 per cent Mn, 0.04 per cent Si, 0.006 per cent P and 0.028 per cent S. Tensile properties are these: Tensile strength 59,000 psi, yield strength 31,500 psi, elongation 40 per cent and reduction of area 65 per cent.

In a smooth surface condition (crack-free), a sample plate could be bulged extensively by the use of explosion loading. This fact demonstrates high ductility, as predicted by the tensile test, even for very high loading rates. However, the introduction of small but sharp cracks resulting from an "arc strike" (common welding defect) changes the ductility of the metal so that a brittle fracture is developed by the impact of a weight. When it is realized that no visible deformation

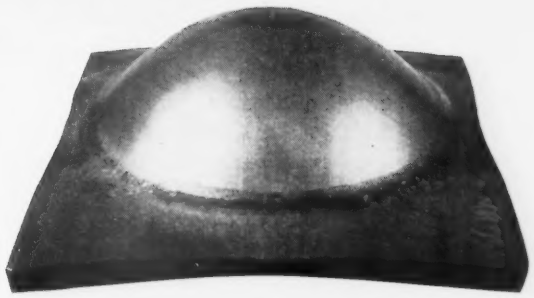
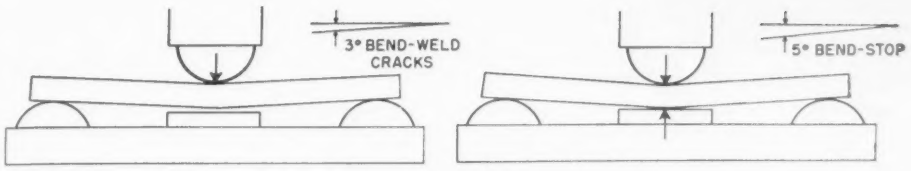


Fig. 2—Bulge developed by explosion loading of plate of nodular iron 1 x 14 x 14 in. at 60°F shows extensive deformation prior to fracture when plate is tested in the absence of notches



Nodular Irons

preceded the fracture (plate halves remained perfectly flat), the critical effects of notches become readily apparent. The behavior of this steel plate in the presence of the notches is such as to compare more to what would be expected of a cast iron than of a supposedly ductile structural steel. Fortunately, conventional cast and rolled steels may be made to behave in this brittle fashion only at temperatures in the range of or below freezing. The high sensitivity to temperature changes demonstrated by ferrous metals in a notched condition is well known.

Nodular iron is characterized by a matrix structure equivalent to that of a high silicon cast steel with the added feature of dispersed nodules of graphite. The spherical shape of the nodules serves to eliminate the condition of internal sharp notches which characterizes the flake irons, and for this reason good tensile ductility may be attained by proper heat treatment of the matrix material. This statement means simply that tensile tests of gray iron are in reality "notch tests" because of the presence of the graphite flakes. By the introduction of notches, nodular iron behaves similarly to steels in that ductility may fall to very low levels depending on the sharpness of the notch and the temperature. Thus notch ductility is an important consideration in the use of nodular irons, as it is for steels.

Fig. 2 illustrates that nodular iron of good tensile ductility develops extensive deformation prior to fracture when tested in the absence of notches. Chemical analysis of this plate is 3.30 per cent C, 0.35 per cent Mn, 2.35 per cent Si, 0.03 per cent S, 0.03 per cent P and 10 per cent pearlite. Tensile properties include tensile strength 60,000 psi, yield strength 41,000 psi, elongation 25 per cent and reduction of area 23 per cent. This illustration

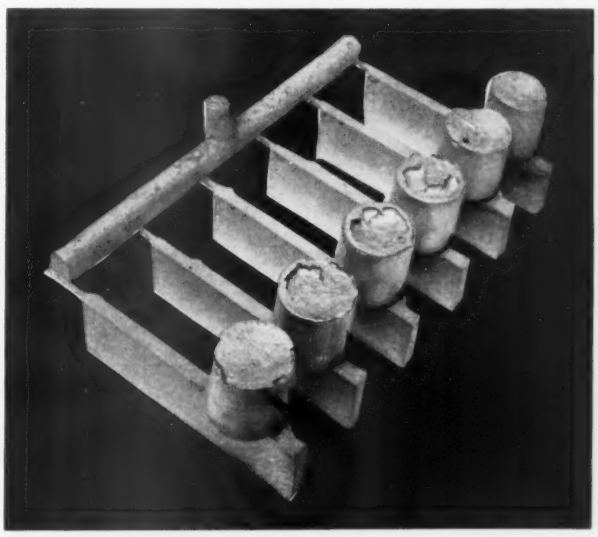


Fig. 4—Drop weight specimens upon removal from mold

serves to demonstrate that the predictions of the tensile test are in fact achieved, as in the case of the steels, for conditions which correspond to those of the tensile test—that is, with no notches present. In tests such as those shown in Fig. 2, gray iron plates shatter without visible deformation, as is to be expected since the tensile ductility of gray irons is essentially of nil value.

Engineers and designers ordinarily rely on small notched specimens, such as Charpy V, to evaluate ductility in the presence of notches. Because of the small size of such specimens and the arbitrary geometry of the notch (relatively dull notch compared to sharp cracks which are the problem in service), these data can be applied to service only by empirical correlation. For example, structural mild steels develop brittle fracture in service when sharp cracks are present and the temperature is such that Charpy V notch tests give values of less than 10 ft-lb; however, not all types of steels follow exactly this pattern[1,2]. In general, Charpy tests have been used qualitatively to grade materials of a given class with respect to their relative notch sensitivity. For example, Charpy V transition curves for various nodular irons, Fig. 5[3], show that increasing Si, P and pearlite raises the transition temperature; this change is interpreted to mean that the temperature range of sensitivity to notches is raised and the probability of brittle fracture is increased. Accordingly, when notch ductility is desired, preference is given to materials of low transition temperature characteristics—that is, material of low Si, P and pearlite contents.

Whether or not a nodular iron casting would be subject to brittle failure at a specific temperature would depend not only on the properties of the material, but also on the sharpness of the notch which it contains. It would be impractical to conduct tests for different notch acuities, and, since many flaws are very small, it is virtually impossible to determine the most severe notch condition present. The approach taken at the Naval Re-

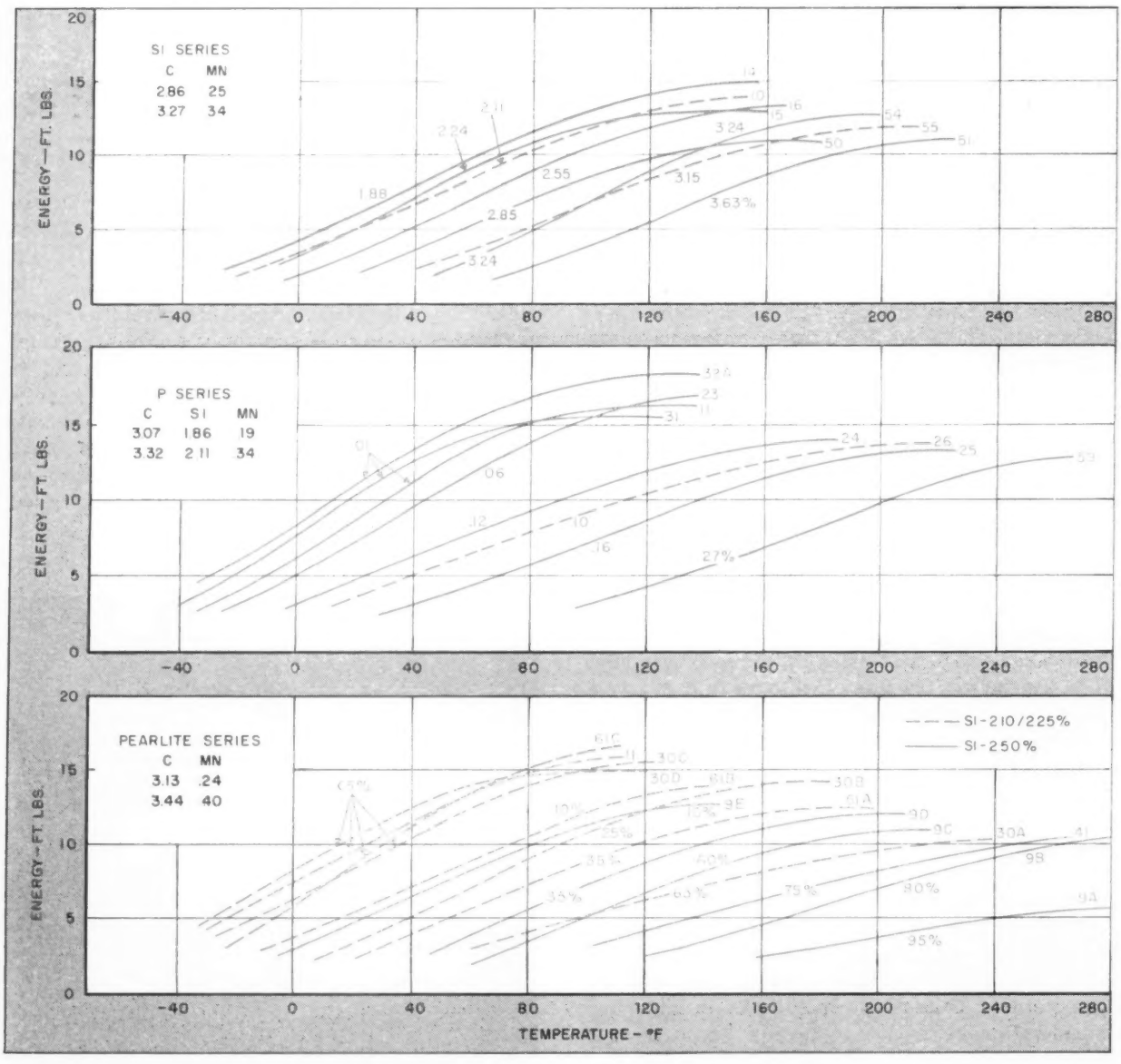


Fig. 5—Charts show the Charpy V transition curves of various nodular irons

TABLE I—Transition Temperatures by Tests and by Calculations

CLASS 1

Heat No.	% C	% Si	% Mn	% P*	Other	% Pearlite*	% Carbide*	BHN	Measured D.W. ° F	Predicted D.W. ° F Formula	Specification Test at 80° F			
43	3.43	1.90	0.19	...	.....	..	..	143	—50	—40				
13	3.54	2.17	0.32	...	.....	..	..	140	—40	—10				
27	3.10	1.94	0.19	...	.32 Cu	..	..	137	—40	—30				
21	3.21	2.16	0.03	...	.....	..	..	137	—30	—10				
37B	2.94	2.18	0.23	...	.....	..	..	149	—30	—10				
39	2.96	2.03	0.23	...	1.05 Ni	..	..	149	—30	—20				
61C	3.15	2.24	0.25	...	.....	2	..	143	—30	—10				
57	3.92	2.25	0.25	...	.....	..	..	149	—20	0				
28	3.04	2.01	0.19	...	.62 Cu	..	..	...	—20	—30				
30D	3.30	2.25	0.40	...	.....	1	..	131	—20	0				
32A	3.08	2.11	0.22	...	1" section	..	..	137	—20	—20				
31	3.07	1.99	0.19	...	.....	..	..	143	—20	—30				
14	2.90	1.88	0.32	...	.....	..	..	143	—20	—40				
11	3.23	2.10	0.34	...	.....	..	..	137	—20	—20				
13C	3.38	2.40	0.35	.009	.....	3	..	140	—20	+ 10	0	0		
29	3.11	2.12	0.19	...	.89 Cu	..	..	149	—10	—20				
23	3.11	2.11	0.27	.06	.....	..	..	143	—10	+ 10				
30C	3.30	2.25	0.40	...	.....	4	..	146	—10	0				
22	3.27	2.08	0.54	...	.....	..	..	143	—10	—20				
10	2.86	2.11	0.34	...	.....	..	..	143	0	—20				
18	3.29	2.13	0.31	...	.31 Ni	..	..	146	0	—10				
20	3.15	2.13	0.28	...	.88 Ni	..	..	149	0	—10				
61B	3.15	2.24	0.25	...	.....	11	..	152	0	+ 10				
32B	3.08	2.11	0.22	...	2" section	..	..	137	0	—20				
32C	3.08	2.11	0.22	...	4" section	..	..	137	0	—20				
35	2.86	1.87	0.43	.08	.....	..	..	143	0	0				
37A	3.48	1.93	0.43	.08	.....	..	..	140	0	—40	0			
15	2.94	2.24	0.31	...	.....	..	..	146	0	0				

CLASS 2

19	3.24	2.13	0.29	...	.62 Ni	..	..	149	+ 10	—10				
13B	3.38	2.40	0.35	.009	.....	11	..	149	+ 10	+ 20	0	0		
42	2.78	2.02	0.14	...	.....	..	..	...	+ 10	—20				
9NE	3.44	2.49	0.40	...	.....	8	..	149	+ 20	+ 20				
2C	3.17	2.52	0.30	.04	.....	6	..	170	+ 20	+ 30	0	0	0	
30A	3.19	2.55	0.45	.04	.....	..	..	156	+ 20	+ 30	0	0		
13D	3.38	2.40	0.35	.009	.....	30	..	160	+ 30	+ 50	0	0		
30E	3.19	2.55	0.45	.07	.....	..	..	159	+ 30	+ 50	0	0		
39A	3.07	2.75	0.40	.011	.....	..	..	152	+ 30	+ 40	0	0	0	
45	2.71	2.13	0.32	.082	.....	..	..	163	+ 30	+ 20	0			
16	2.94	2.55	0.31	...	.....	..	..	156	+ 30	+ 20				
24	3.15	1.86	0.21	.012	.....	..	..	143	+ 30	+ 30				
61A	3.15	2.24	0.25	...	.....	30	..	152	+ 30	+ 40				
40	3.13	2.47	0.22	...	.....	..	..	152	+ 30	+ 10				
30B	3.30	2.25	0.40	...	.....	24	..	163	+ 40	+ 30				
5F	3.10	2.51	0.33	.033	.....	18	..	174	+ 40	+ 40	0	0	0	
32	2.98	2.82	0.40	.05	.....	..	..	156	+ 40	+ 60	0	0		
34A	3.41	2.48	0.40	.06	.....	..	..	143	+ 40	+ 40	0	0		
46	2.86	2.36	0.28	.085	.....	..	..	167	+ 40	+ 50	0	0		
50	2.92	2.85	0.30	...	.....	..	..	156	+ 40	+ 50				
IR1	3.32	2.59	0.27	.028	.56 Ni	..	..	170	+ 40	+ 30	0	0		
IR2	3.25	2.56	0.22	.03	.58 Ni	..	..	167	+ 40	+ 30	0	0		
4E	3.10	2.61	0.42	.035	.....	25	..	179	+ 50	+ 70	0	0		
6G	3.09	2.41	0.30	.05	.....	..	..	163	+ 50	+ 30	0	0		
39B	3.07	2.91	0.40	.010	.....	..	..	156	+ 50	+ 50	0	0	0	0
62	3.00	2.38	0.34	.086	.....	3	..	...	+ 50	+ 50				

CLASS 3

13E	3.38	2.40	0.35	.009	.....	45	..	170	+ 60	+ 80	0	0		
30C	3.19	2.55	0.45	0.10	.....	..	..	162	+ 60	+ 70	0	0		
40	2.25	2.15	0.30	.095	.....	..	..	152	+ 60	+ 40	0	0		
26	3.32	2.06	0.21	.10	.....	..	..	150	+ 60	+ 30				
39C	3.07	3.03	0.40	.010	.....	..	..	159	+ 70	+ 60	0	0		
41	2.22	2.38	0.30	.107	.....	..	..	158	+ 70	+ 60	X	0	0	
44	2.19	2.28	0.28	.102	.....	..	..	153	+ 70	+ 50	0	0		
62	3.0	2.38	0.34	.086	.....	11	..	156	+ 80	+ 60				
9ND	3.44	2.49	0.40	...	.....	39	..	165	+ 80	+ 60				
25	3.11	2.08	0.21	.16	.....	..	..	160	+ 80	+ 70				
37C	3.48	1.93	0.43	.08	.....	..	..	149	+ 80	....				
36	3.72	2.07	0.44	.22	.....	..	..	156	+ 80	+ 120	0	0		
30D	3.19	2.55	0.45	.13	.....	..	..	163	+ 80	+ 90	X	X	X	X
8I	3.20	2.10	0.40	.16	.....	10	..	167	+ 80	+ 90	X	X		
7H	3.25	2.80	0.28	.04	.....	..	..	165	+ 80	+ 50	X			
30A	3.30	2.25	0.40	...	.....	67	..	170	+ 90	+ 110				
54	2.98	3.24	0.26	...	.....	..	..	167	+ 90	+ 80				
9J	3.21	2.30	0.30	.15	.....	..	..	159	+ 90	+ 90	X	X		
55	3.27	3.15	0.32	...	.....	..	..	170	+ 100	+ 80				
39D	3.07	3.21	0.40	.011	.....	..	..	165	+ 100	+ 80	X	X		
33	3.37	2.50	0.42	0.16	.....	..	..	149	+ 100	+ 110	X	X		
30B	3.19	2.55	0.45	0.04	.....	..	..	163	+ 100	+ 100	X			

CLASS 4

37B	3.48	1.93	0.43	.08	.....	..	..	149	+ 110	....	X	X		
1B	3.45	2.49	0.30	.14	.....	5	..	170	+ 120	+ 100	X	X		
3D	3.18	2.70	0.30	.15	.....	9	..	183	+ 120	+ 130	X	X	X	
13A	3.38	2.40	0.35	.009	.....	75	..	179	+ 120	+ 140	X			
51	2.95	3.63	0.25	...	.....	..	..	180	+ 120	+ 120				
9NC	3.44	2.49	0.40	...	.....	59	..	190	+ 120	+ 110				
41	3.13	2.47	0.22	...	.....	75	..	223	+ 130	+ 140				
59	3.07	2.03	0.27	0.27	.....	..	..	170	+ 160	+ 150				
9NB	3.44	2.49	0.40	...	.....	78	..	202	+ 160	+ 150				
10K	2.83	2.20	0.11	...	.....	78	..	235	> + 150	+ 180	X			
34B	3.41	2.48	0.40	.06	.....	..	..	167	> + 210	....	X			
42	3.21	1.84	0.25	.087	.....	6	18	207	> + 210	....				

*Where not listed, less than .01P, 5% pearlite, 3% carbide. X indicates specimen failed; 0 indicates specimen did not fail.

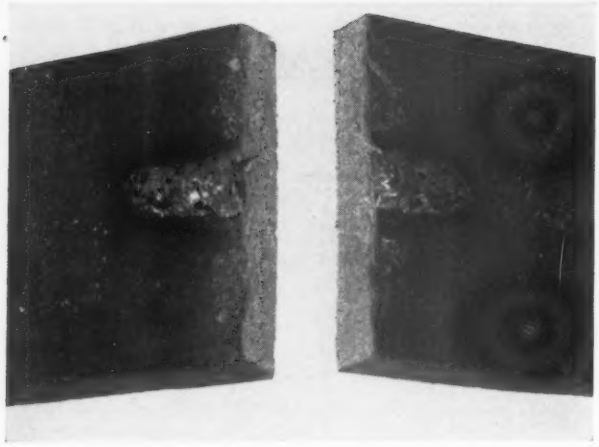


Fig. 6—Nodular iron drop weight test specimen broken at the nil-ductility transition temperature

search Laboratory to determine the fracture initiation characteristics of metals was to evaluate notch ductility under the most severe conditions—namely, in the presence of an extremely sharp notch.

The procedure entails introducing a sharp crack in a specimen of a size sufficient to be considered comparable to a structural or casting part and to determine the temperature below which it is not possible to develop small amounts of deformation without brittle fracture. This critical temperature, defined as the "nil-ductility transition," signifies the temperature of change from ability to deform despite the presence of the sharp crack (appreciable per cent elongation) to a condition of essentially no permissible deformation (0 per cent elongation) in the presence of the sharp crack. Investigations of a wide variety of steels and nodular irons have shown that the change from high notch ductility to essentially nil notch ductility occurs sharply, over approximately a 20° F temperature range. It is interpreted that brittle failure would not be initiated in service if the material retained the ability to deform appreciably in the presence of the sharpest possible crack which could be present. Brittle fracture in service becomes possible when the temperature falls below the sharp crack ductility transition.

The subject test procedure is known as the drop weight test. This test has been demonstrated to give results which correlate with actual service failures[1,2]. Since this test shows the resultant effect of all the many variables (such as chemical composition, heat treatment and microstructure) which affect fracture resistance, it is ideally suited for use as an alloy development tool or as a specification test for materials which are to be subjected to severe service conditions. As a specification test it would obviate the need for strict composition and heat treatment specifications. This report illustrates the manner in which the test may be used for this purpose and as a corollary presents a comprehensive evaluation of the fracture characteristics of various nodular irons.

Drop Weight Test—Drop weight test equipment and the specimen used in the test are shown in Fig. 3. The condition of a sharp flaw is introduced by the cracking of a brittle, hard surfacing type weld bead deposited on the surface of the test piece. Usually six specimens, 1 x 3½ x 14 in., are sufficient to determine the nil ductility transition temperature. The nodular iron specimens were cast to size in the manner shown in Fig. 4. Knock-off risers were used for feeding. No machining is required since the dimensions are not critical. After having been cooled or heated to the desired testing temperature, the specimen is placed, with the weld downward, across the supports at the bottom of the machine and is loaded by the drop of the 60-lb weight from a height sufficient to cause the center of the specimen to contact the stop which limits deformation to a 5-degree bend. A drop from a height of 8 ft has been found sufficient to accomplish this objective with materials of the nodular iron strength class. The brittle weld cracks at approximately 3 degrees of the bend, thereby creating an extremely sharp, cracklike notch in the specimen. This test determines whether the very small amount of deformation associated with the additional 2 degrees of bending after the crack forms is sufficient to cause the specimen to fracture. Fig. 3 shows that the brittle weld has been notched prior to testing. This procedure, although not essential, has been adopted to insure that the crack will occur at the center of the specimen. Fig. 6 illustrates the fracture appearance of a nodular iron drop weight specimen broken at its nil-ductility transition temperature.

Few Test Samples Are Required

By choosing testing temperatures such that the transition temperature is bracketed, the highest temperature of essentially nil-ductility usually can be established within a span of 10° F with six tests. This go-no go test is highly reproducible, as indicated in Fig. 7, which shows the appearance of a large number of specimens which had been removed from a sheet of rolled mild steel (tensile strength 60,000 psi, elongation 35 per cent, reduction in area 50 per cent) and tested at the temperatures indicated. Of 14 specimens tested at 10° F, 13 fractured; of 14 tested at 20° F, 13 did not fracture. The nil-ductility transition of this material thus is within the range of 10 to 20° F. Tests using a series of six specimens, conducted on this steel at an earlier date, gave a ductility transition of 10° F, as should be expected from consideration of the results obtained with the extensive sampling illustrated in Fig. 7. Only center portions of specimens are shown. For cast materials, the reproducibility of the test is in the range of ±10° F—that is, a 20° F scatter of "break" and "no-break" results ordinarily is developed. Because of the high sensitivity of the test to composition variables (as will be demonstrated), it is essential that variables such as segregation or surface decarburization be minimized. It is to minimize under-riser segregation in the critical center area of the test specimens

that the risers shown in Fig. 4 are located off-center.

The drop weight test machine can be fabricated easily, and its sharp go-no go features permit inexperienced operators to obtain reliable results. Instruction pamphlets and blueprints of the equipment are available at the Naval Research Laboratory.

Comparing Drop Weight and Charpy Tests—It has been determined that for each class of materials, the nil-ductility transition as determined by the drop weight test corresponds approximately to the temperatures at which certain energy values are indicated by the Charpy V test. For example, the points indicated on the Charpy curves of Fig. 5 are the drop weight ductility transition temperature intersections with the corresponding Charpy V curves. At these respective temperatures, the Charpy V energy values are between 4 and 7 ft-lb. Charpy values at the nil-ductility transition temperature vary for different materials, but they invariably occur near the lower part of the transition portion of the Charpy V energy curve. Energy value of the upper shelf (flat portion) of the Charpy curve is not related to the nil-ductility (*Please turn to page* 263)

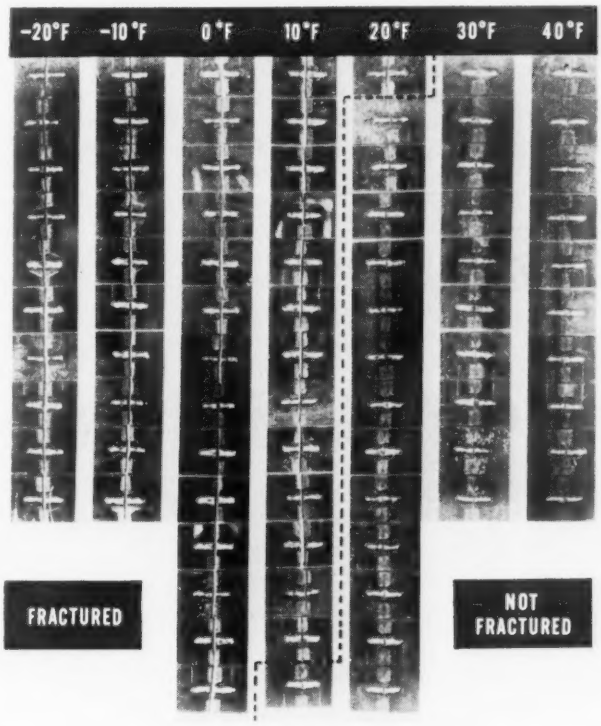


Fig. 7—Reproducibility of drop weight test illustrated by tests on structural steel plates 1 in. thick

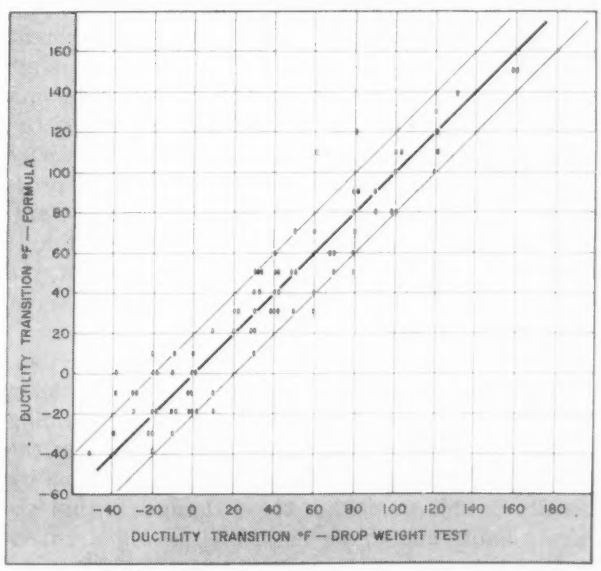


Fig. 9—Correlating formula calculations of ductility transition temperature and drop weight test results

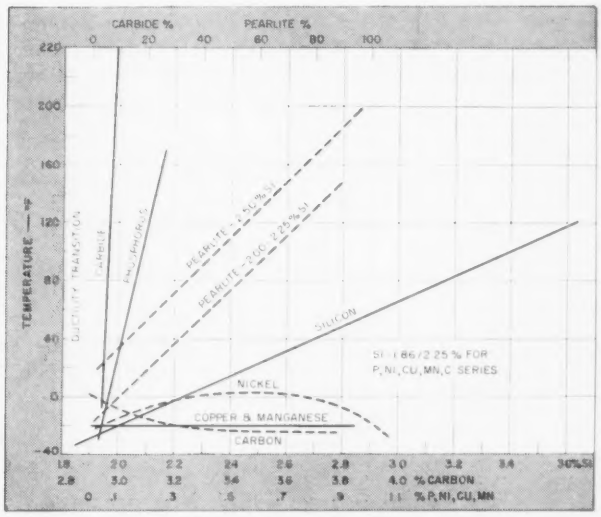


Fig. 8—Charts show effects of composition and microstructure variables on fracture initiation temperature

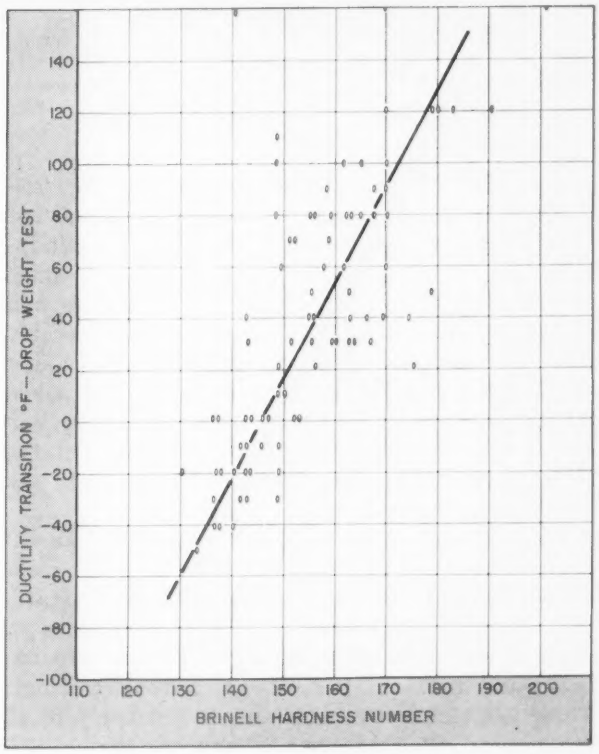
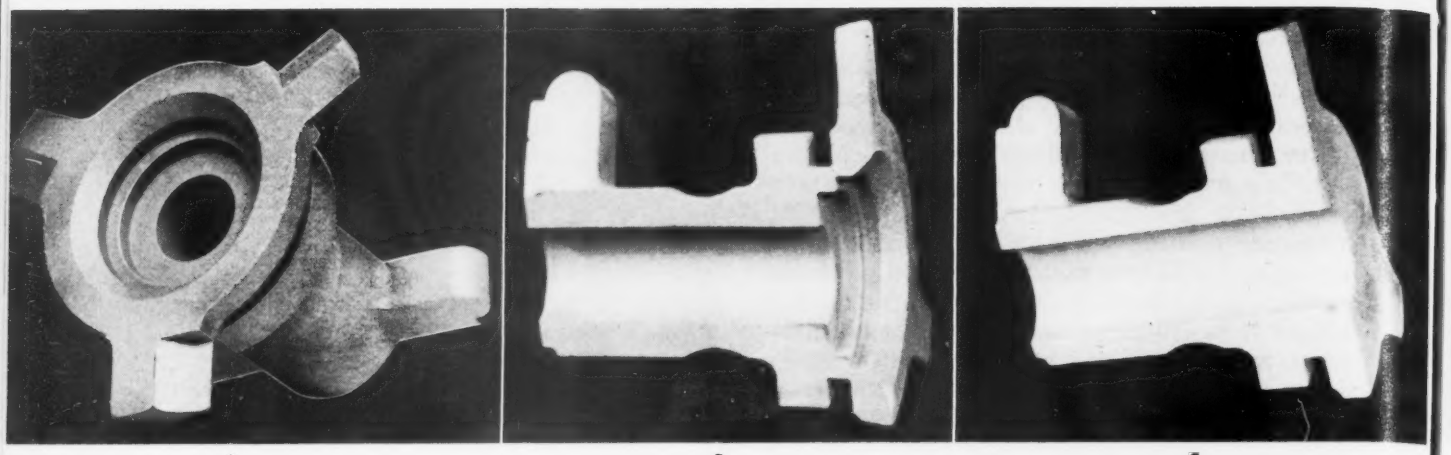


Fig. 10—Relationship of drop weight test ductility transition and brinell hardness of some nodular irons



A B C

Fig. 1—Casting with different section thicknesses, as in Fig. 1A, is difficult to make. Fig. 1B shows cross section. When casting was made with central core continued with a uniform diameter, Fig. 1C, machining operations were needed, but made possible production of good castings

Design and Dimensional Control for

INVESTMENT CASTINGS

In this paper, which was presented before the 1954 annual meeting of the American Society of Tool Engineers, the author explains how casting design affects the degree to which required dimensions can be maintained

By R. L. WOOD
President
Arwood Precision Carting Co.
Brooklyn, N. Y.

INVESTMENT castings can be held to closer tolerances than any other foundry product, but there are definite limits to the accuracy obtainable. These limits are based on two separate kinds of variables which occur during the process and make the attainable accuracy vary considerably from one piece to another. All foundries making precision investment castings frequently are asked by design engineers to state tolerances they can hold. The technically correct answer is that the maintainable accuracy depends entirely upon the design of the piece.

Because such an answer does not satisfy an engineer who wants definite facts at his disposal, most foundries reluctantly have made general statements. The most common is that tolerances of 0.003-in. per in. can be held on nonferrous castings, and 0.005-in. per in. on ferrous castings. These are simply averages and do not apply to all parts or to all dimensions of any one part.

The two types of variations which occur in the production of investment castings are those inherent in the process itself and those caused by special features of the particular design. The inherent variables are due to the nature of the materials used. Investment casting involves the processing of three materials—the pattern wax or plastic, the ceramic mold material and the metal. To secure identical results, all three would have to be processed under identical conditions of temperature, humidity and time. To control operating conditions with this accuracy would render the cost of the process prohibitive, and for practical purposes it is out of the question.

Variations that occur from day to day in temperature and humidity of the air, as well as human variations in speed and efficiency of performing certain operations, result in minor changes in the finished dimensions of the castings. Each foundry usually is able to predict these changes within accurate limits and to set basic tolerance guarantees so that they include these limits. Fig. 6 is a typical pyramidal chart showing this normal range of dimensional variation. (*Please turn to page* 225)

Fig. 2—Right angle between sections produces zone of weakness at section junction and results in cracking, shown in upper view

Fig. 3—Shapes like wedges and cones are relatively simple to produce as investment castings

Fig. 4 — Casting with long, rectangular core supported only at lower end could not be cast within the required dimensions, but running core through solid boss (bottom) provided it with an anchor and prevented its shifting

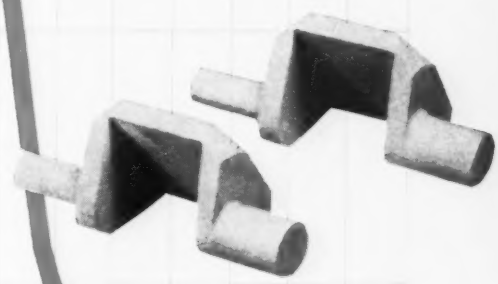


Fig. 5 — Straight-line relationship of lugs can be maintained when they are blended into the casting body with slight fillets which permit straightening

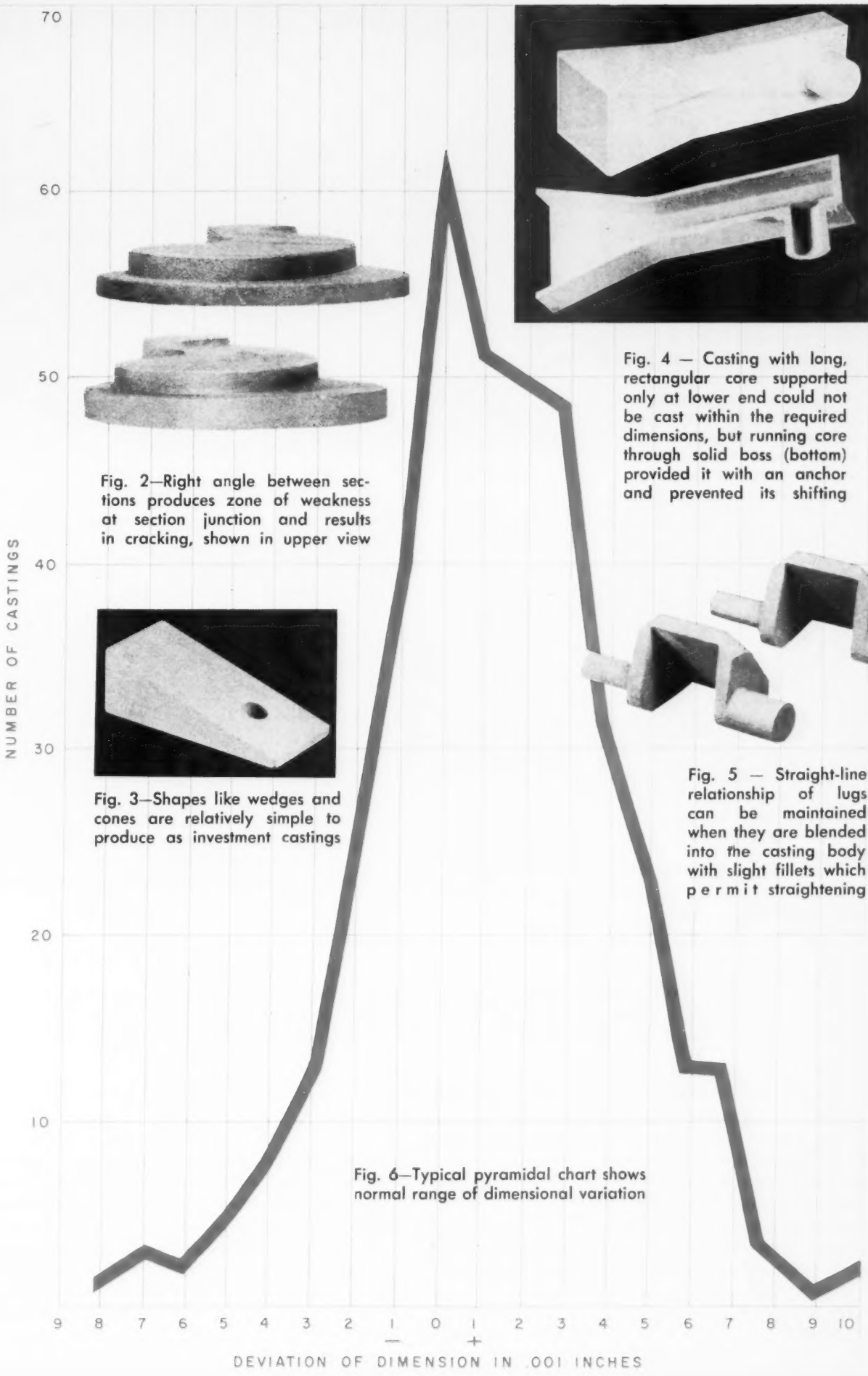
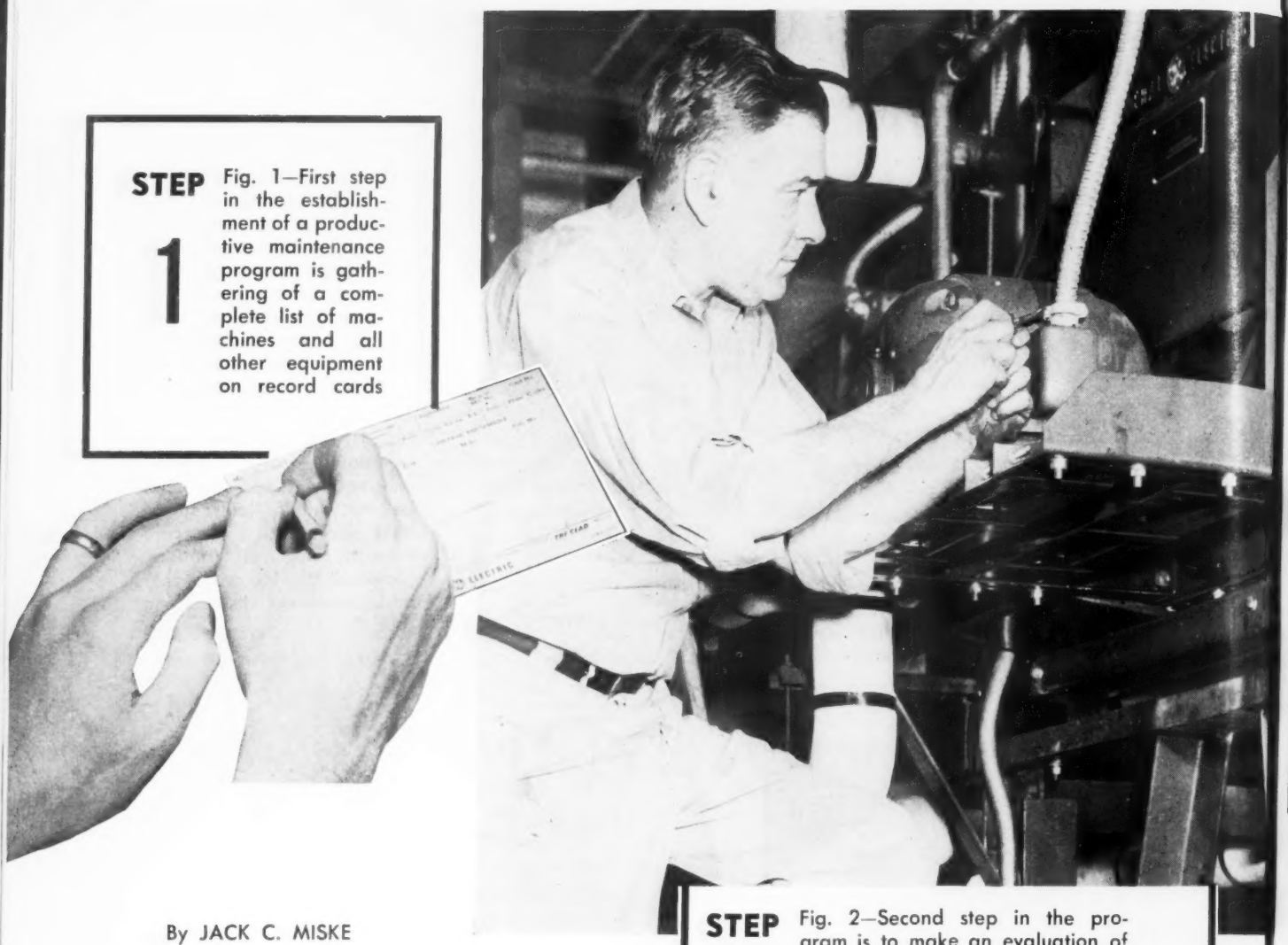


Fig. 6—Typical pyramidal chart shows normal range of dimensional variation



STEP 1 Fig. 1—First step in the establishment of a productive maintenance program is gathering of a complete list of machines and all other equipment on record cards

STEP 2 Fig. 2—Second step in the program is to make an evaluation of routine maintenance to determine how much care equipment warrants

A Plan for
PRODUCTIVE MAINTENANCE

The article presents the broad outlines of a plan for preventive maintenance that is designed to cut downtime and to reduce production cost

By JACK C. MISKE
Assistant Editor

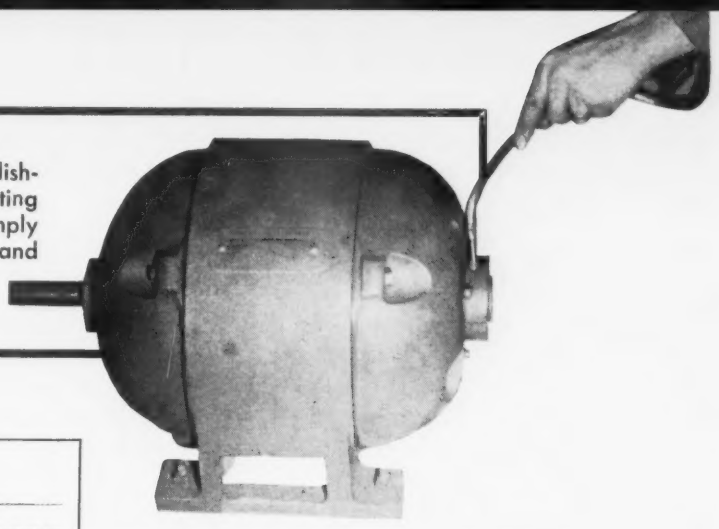
IMPORTANCE of maintenance—particularly preventive maintenance—increases proportionately as an industry moves closer to automatic operation. In fact, proper maintenance would be the one overwhelming problem of a fully automated plant, in which breakdowns might shut down production completely.

The trend to automation in foundries and the ruggedness of conditions under which foundry equipment must operate underline the need for good maintenance programs in the industry. Such a program, designed for industry in general and applicable to the foundry field as much as to any other, has been drawn up by the Apparatus Sales Division of General Electric Co., Schenectady, N. Y.

The division's objective was to formulate a preventive maintenance program sufficiently productive to make possible substantial savings. In the light of this goal, GE calls its system "productive maintenance" because it is positive, not negative, in that it goes beyond mere prevention. It aims to produce, to pay its own way, by yielding longer

STEP 3

Fig. 3—Third step is the establishment of a routine operating control system, which is simply the scheduling of inspection and work on an efficient basis



EVALUATION OF PLANNED OVERHAUL REQUIREMENTS

DATE _____

LOCATION _____ DEPARTMENT _____ MACHINE NO. _____

MACHINE RATING _____

AGE SINCE INSTALLATION OR LATEST OVERHAUL _____

OPERATING CONDITIONS (ATMOSPHERE-TEMPERATURE) _____

HOURS OPERATION PER DAY _____

ELECTRICAL CONDITION READINGS _____

CONDITION OF INSULATION _____

MECHANICAL CONDITION _____

POSSIBLE RETIREMENT OR REPLACEMENT OF MACHINE _____

PRODUCTION TIME LOST FOR PLANNED OVERHAUL	TOTAL DOWN-TIME COST	COST OF PLANNED OVERHAUL	TOTAL PLANNED OVERHAUL COST
_____ DAYS	$_____	$_____	$_____

PRODUCTION TIME LOST IN EVENT OF MAJOR FAILURE	TOTAL DOWN-TIME COST	COST OF REPAIR & PARTS	TOTAL FAILURE COST
_____ DAYS	$_____	$_____	$_____

STEP 4

Fig. 4—Step 4 is the evaluation of critical maintenance. Chart at left helps comparison of total planned overhaul cost with total failure cost. Analysis chart below shows how to decide what parts to stock. Part involved here is a large motor. Downtime was estimated at $700 per hour

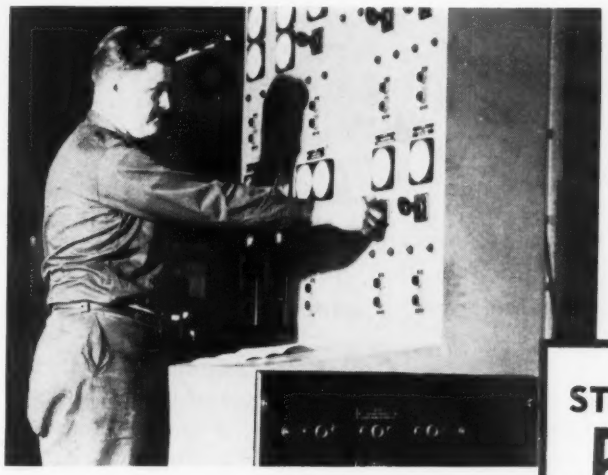
EVALUATION OF CRITICAL PARTS PROTECTION REQUIREMENTS

(The Evaluation is based on the failure of a part which requires the longest repair time such as armature coils)

	NO MAJOR PARTS STOCKED	ARMATURE COILS STOCKED	COMPLETE ARMATURE STOCKED	COMPLETE MACHINE STOCKED
REPAIR TIME	10 days to make coils *	6 days to rewind armature *	7 hours to install new armature	3 hours to replace motor
TOTAL DOWNTIME COST	$168,000	$100,800	$4,900	$2,100
COST OF PARTS PROTECTION	0	Coils: $4,664	Armature: $25,600	Motor. $46,000
COST OF REPAIR	$12,730	$5,900	Installation: $850	Installation: $360
TOTAL FAILURE COST	$180,730	$111,364	$31,350 *	$48,460 * *

*Add disassembly, assembly and transportation time to actual repair time

**Add repair cost, on straight-time basis, of failed unit



STEP 5

Fig. 5 — Final step is the establishment of a continuing program of critical maintenance, which includes ordering parts for long-time storage and setting up an overhaul schedule

equipment life, increased productivity and reduced product cost.

The GE program consists of five basic steps: 1. Gathering of complete equipment data. 2. Evaluation of routine maintenance so that cost of equipment will determine how much care is warranted. 3. Establishment of a routine operating control system. 4. Evaluation of critical maintenance. 5. Establishment of a critical maintenance program. Illustrations accompanying this article illustrate these five steps.

To accomplish Step 1 of the system, a complete list of plant equipment and machines must be gathered. It is essential to know what equipment is in the plant and where it is located in order to maintain it intelligently. All physical components should be listed, under such categories as building, distribution services, plant services, production or process machinery, materials handling equipment, other electrical equipment, etc.

Once such a survey has been made, a list of all the equipment on which (*Please turn to page* 268)

FITTING THE FOUNDRY WORKER TO HIS JOB

A job-placement medical examination program at American Brake Shoe Co. plants differs from most prehiring examinations in that it is designed to place applicants in the work for which their health best suits them

By PHIL HIRSCH

A JOB-PLACEMENT medical program, aimed at fitting the worker's physical capabilities to the job's physical requirements, is in effect at American Brake Shoe Co. and has reduced substantially the company's foundry worker accident rate. If adopted by the foundry industry as a whole, such a program could help reduce the comparatively high accident frequency rate.

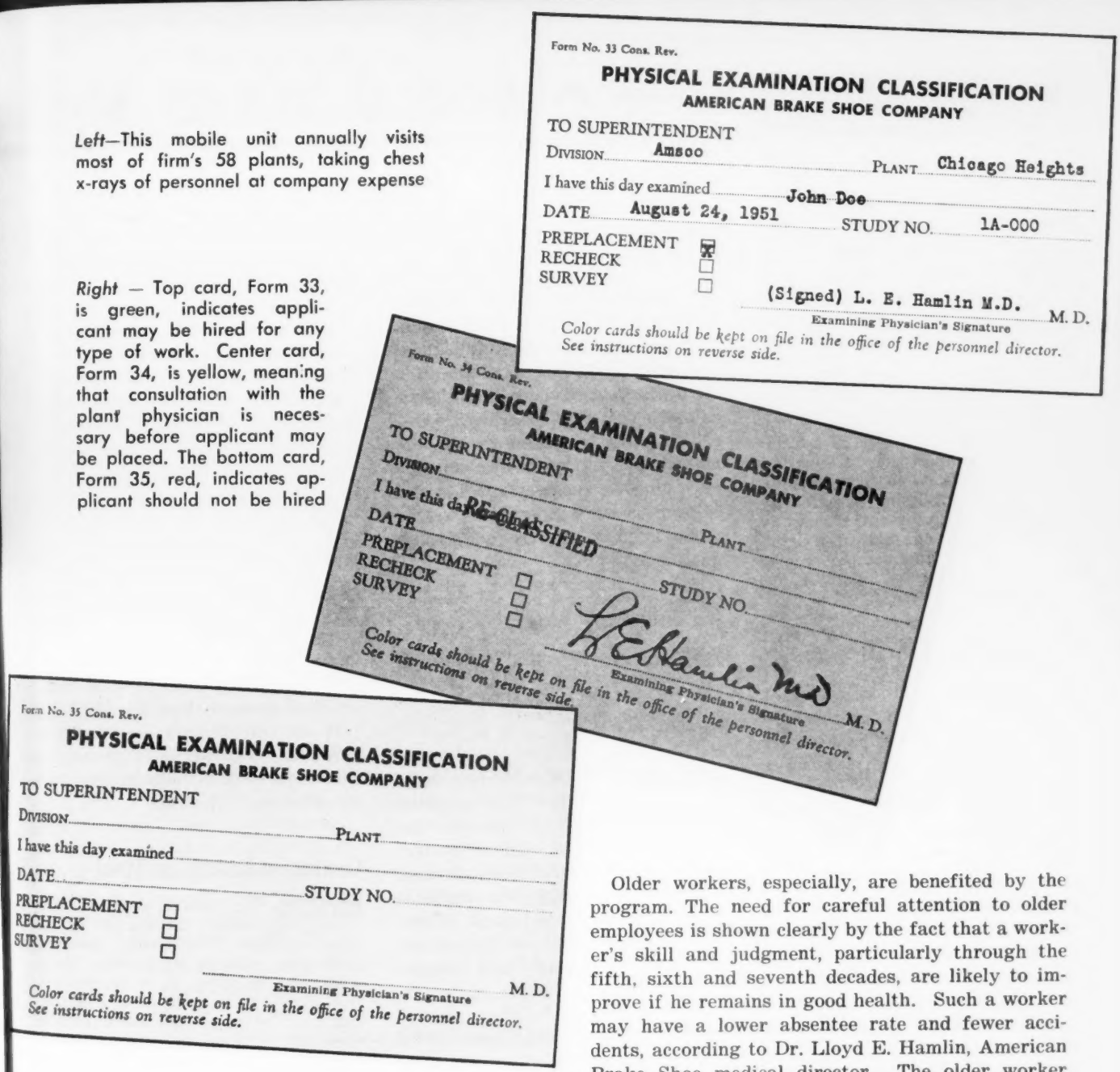
In 1952, foundries ranked 28th among 40 industries in the number of disabling accidental injuries per million man-hours. There were 13.93 disabling accidental injuries per million man-hours in foundries, compared to the all-industry average of 8.40, according to the National Safety Council. In 1953 the frequency for foundries declined to 10.94, against 7.44 for all industries.

Job-placement medical examinations, as practiced by American Brake Shoe Co., which operates a number of foundries among its 58 plants in the United States and Canada, differ from certain traditional prehiring examinations. The prehiring examination implies that abritrary standards for employment have been set and that the results of the medical examination of the prospective employee will be compared with this fixed standard.

Job-placement medical examinations are designed, however, to discover the abilities and capacities of the applicant and to place him in work that is best suited to him so that neither his nor his fellow workers' health or safety will be jeopard-

Left—This mobile unit annually visits most of firm's 58 plants, taking chest x-rays of personnel at company expense

Right — Top card, Form 33, is green, indicates applicant may be hired for any type of work. Center card, Form 34, is yellow, meaning that consultation with the plant physician is necessary before applicant may be placed. The bottom card, Form 35, red, indicates applicant should not be hired



ized while he is on the job.

The program covers both job applicants and workers already on the payroll. When disabilities are discovered in the former group, the position which the applicant seeks is studied to see whether the handicap will effect his work performance or the safety of operations. Sometimes, it is necessary to place an applicant in another department to reduce the possibility of accident.

Similarly, workers who have been on the payroll for some time and are found to have poor vision, or any other disability, might be transferred to other positions, which they can handle safely. Employees who become sick or are involved in accidents are required, upon return to work, to present statements from their attending physicians that they are still physically capable of satisfactorily performing their jobs. If further investigation of the disability appears necessary, following periodic physical examination, the company medical director so requests.

Older workers, especially, are benefited by the program. The need for careful attention to older employees is shown clearly by the fact that a worker's skill and judgment, particularly through the fifth, sixth and seventh decades, are likely to improve if he remains in good health. Such a worker may have a lower absentee rate and fewer accidents, according to Dr. Lloyd E. Hamlin, American Brake Shoe medical director. The older worker frequently has less spoilage of materials and finished products and generally exhibits a higher degree of loyalty to his employer.

On the debit side, however, maintenance of health tends to become increasingly difficult during the fifth through seventh decades, the medical director pointed out. Physical motion and reaction time often are slowed, and there is inability to withstand fatigue. A drying-up process goes on in the cells of the body which may be more evident in the eyes and ears than elsewhere.

The elderly worker sometimes is particularly vulnerable to certain diseases, including arthritis, heart conditions, high blood pressure, pneumonia and nervous and mental upsets. Resistance to infection also seems to be lowered, and the incidence of tumor growths, both benign and malignant, definitely is increased.

Dr. Hamlin reported that "the group of elderly workers, both percentagewise and in point of overall numbers of the total work force has become augmented in recent (*Please turn to page* 240)

QUESTIONS

Aluminum Casting Equipment

QUESTION What additional equipment would be needed for a relatively small operation in casting aluminum. What we have in mind is a capacity of 200 lb. We already have all the equipment necessary for production of malleable iron. What type of furnace would be needed? What type of cleaning equipment is necessary, etc.

ANSWER For production of aluminum alloy castings, you will need an oil or gas-fired crucible or iron pot furnace for melting the metal, a band saw or sprue cutter for removal of the gating system, snagging equipment, a supply of molding sand, a temperature indicating instrument and possibly a sand blast unit for finishing the surface. Although you do not specifically say so, we assume that the 200-lb capacity refers to the daily run, and we believe that a crucible type furnace which will take a No. 50 crucible holding about 50 lb of aluminum will serve. With that arrangement, melting and molding can be scheduled so that when sufficient molds are available to take the pot full of metal, the latter is just about up to temperature and ready for skimming and pouring.

Sand for aluminum molding undoubtedly will be finer than that being used in production of malleable. Where the castings are small, and exceptionally smooth surfaces are desired, fine-grain sands around 200 or so are used. Since you do not indicate the type of castings, it is suggested that when that is determined, consultation with your sand supplier will result in a suitable sand.

Gating systems can be removed from the castings with a sprue cutter or preferably with a metal-cutting band saw, or even with a hack saw. Gate stubs, etc., are smoothed off with abrasive wheels, and again your supplier can advise you as to the suitable types. Ordinarily, only a little sand adheres to aluminum castings when they are removed from the mold, and what little does remain falls off during subsequent handling or can be brushed off. However, abrasive blasting with sand or metallic materials gives a uniform appearance since it removes surface discolorations, minor surface roughness, marks left from grinding gate stubs, etc.

No Chill from Aluminum Paint

QUESTION Could you give us information on or refer to any literature on the subject of spot-coating baked sand cores with aluminum paint to eliminate use of chills?

ANSWER To be effective any chilling material has to have capacity to absorb heat, or change the structure in some manner as tellurium does in the case of cast iron by stabilizing the carbide. Even an appreciable film of aluminum paint would have little heat absorbing capacity and would have little if any effect on structural changes. Only effect of aluminum paint we can think of is that it possibly might result in a smoother surface where it comes in contact with the molten metal.

Iron Grids Will Resist Wear

QUESTION We have a customer who needs 8000 sq ft of cast iron grids to be installed flush in a 9-in.-thick concrete slab. However, he wants to be sure the castings will stand up under continuous use by heavy machinery with steel treads.

ANSWER So far as we know, there is no reason why the cast iron grids imbedded in concrete should not give excellent wear results. You might point out to your customer that practically all of the manhole covers and frames are made of cast iron—have been for years—as well as street drainage catch basins. While he might say that today the only vehicles are rubber-tired, you can tell him that they stood up just as well in the days of horse-drawn vehicles with iron-tired wheels.

It also should be pointed out that cast iron floor plates with and without an abrasive coating are in use in mills, factories and foundries where heavy traffic conditions warrant the use. In foundries we have seen cast iron floor plates used on gangways and on charging floors. Incidentally you might be interested to know that cast iron plates and grids were being used in England and on the continent about 20 years ago and probably still are in use. An article in the September, 1934 issue of FOUNDRY describes the application, and indicated that some had been in use two or three years successfully. However, cost of such pavement was higher, and undoubtedly had an effect on wider use.

Casting-in Inserts in Steel

QUESTION We would like to cast $\frac{7}{8}$-in. tool steel inserts in some steel castings $\frac{3}{8}$-in. thick. Inserts are $\frac{5}{8}$-in. square and since they wear out in time, it is necessary that they can be pressed out of the castings with a hydraulic press. Can you suggest materials to coat the inserts to prevent fusion?

ANSWER We do not believe your idea of casting-in the tool steel inserts will give you the results anticipated because they will not be held tightly in position after the casting cools. When the molten steel comes in contact with the inserts they will expand to some degree, and the steel will solidify around the enlarged inserts. When the two pieces cool, the amount of contraction will not be the same, and the inserts will not be held tightly.

Also, with the insert and casting of the same section we doubt that any fusion will take place unless the location is such that a considerable quantity of steel flows over the insert. As far as a coating is concerned, we believe the regular silica mold wash will

serve your needs satisfactorily.

We believe that if you wish to obtain a tight fit of the inserts in the steel casting, it will be advisable to core out the holes slightly smaller than the inserts and broach them to press-fit size. With suitable punch or press equipment, it would be possible to punch the holes from the solid steel casting.

Clay Content in Sand Is Low

QUESTION We are having difficulty with expansion scabs on hand-rammed sewer pipe which produces leakers under pressure. Tests show average strength around 4.5 psi, permeability 80 and moisture 7.5 per cent.

ANSWER Expansion scabs, that is rough thin layers of metal partially separated from the body of the casting by a thin layer of sand, result from such causes as high moisture, low clay content, low carbonaceous content, etc. In your case it appears that the clay content is too low and moisture somewhat high. Green compression strength should be from 7 to 9 psi, and the moisture around 6 per cent. Permeability seems all right. Possibly the higher moisture content is employed to give the sand what the molder terms the proper "feel," and where bond or clay content is low, increase in moisture appears to improve the sand's workability, but unfortunately causes other trouble.

Alloy Iron Information Given

QUESTION We would like to obtain all the information we can obtain on Ni-Hard iron as one mining company wants us to make some castings for them from that material. Also we plan to make a 3500-lb casting for a railroad, and would like to know how much nickel should be added to make it wear a little longer, and if some other material should be added.

ANSWER Ni-Hard is a proprietary composition developed by the International Nickel Co. Inc., 67 Wall St., New York, and we suggest you get in touch with that firm for further information. Material is an alloy cast iron which is extremely hard and may be cast in sand or in chills. Hardness is developed by the 1.4 to 3.5 per cent chromium and 4.00 to 4.75 per cent nickel in its composition. Other elements are 3.0 to 3.6 per cent total carbon, 0.4 to 0.7 per cent silicon, 0.4 to 0.7 per cent manganese, 0.15 per cent sulphur max, and 0.4 per cent phosphorus max.

A high-strength variety has a 2.9 per cent total carbon max, with the other elements the same as the first-mentioned material. Castings made from either composition must be drawn at 400 to 450° F to relieve stresses prior to being placed in service. Alloys are practically unmachinable and are finished by grinding. Brinell hardnesses range from 525 to 675.

Without information on section thicknesses and application or service of the 3500-lb casting, it would be presumptious to make any suggestions relative to nickel or other additions. In order to obtain full benefits from alloy additions, the composition of the iron must be adjusted for the purpose intended.

Abrasive Facing on Door Sill

QUESTION How can an abrasive facing be obtained on cast iron door sills?

ANSWER Some skill and experience are required to produce a satisfactory facing of abrasive material on cast iron or other metal. Essentially, the procedure is to spray the mold face with some type of adhesive, such as sodium silicate, thin clay wash, molasses water, sulphite solution, etc. Then the abrasive material, which usually is silicon carbide grain, is applied in a uniform, thin layer over the sprayed surface. To obtain the desired distribution of the abrasive grain, it generally is shaken over the surface through a screen or sieve of the same mesh-size as the abrasive, which may range from 20 to 60, depending upon surface coarseness desired.

After the abrasive has been applied, the surface is sprayed again to insure that any loose particles are bonded in place. The mold face then is dried thoroughly with a torch. As soon as drying is completed, the mold should be closed and poured since the longer the time element, the greater the possibility of moisture striking back to the mold face, with resulting blows. Iron should be poured as hot as possible.

Wants Plaster Molding Data

QUESTION We are making foundry matchplates by the plaster method and would like to obtain the latest data possible on practices. Plaster producers have been helpful, but there are many things which we would like to know about which they have been able to give us but meager information. We would like to know how the individual molds are eliminated by continuity casting to build up the mold. We understand this is done by pouring one section with a metal strip to start another section, etc. We also have tried a plaster asbestos mix as used by silver shops with some success, but little information seems to be available on these mixtures. We have been able to pour a number of castings from one mold before it wore out.

ANSWER It would appear that by writing to the manufacturers of plaster, you have gone to the proper source for technical information relative to application of gypsum or plaster as a molding medium. Those firms not only are interested in promoting application of plaster, but their experts have access to foundries where plaster is being used and hence would be informed of any new developments.

We do not understand your reference to eliminating the piece or individual molds by continuity casting. Although the procedure indicated—building up a section at a time by separating strips—is employed in production of statuary castings, we cannot see how it can be applied in your case. In the first place, this method is used with the complete object available

—that is the sculptor's original model in whatever medium he employed, and the reason the sectional method is employed is that the numerous undercuts would prevent withdrawing the model from an integral mold. Therefore, the model is set upon a suitable base, and the mold is built up by applying plaster (trowelling consistency) to the model on the desired area, depending on undercuts.

As soon as the plaster air sets or hardens, the material is removed and squared with a sharp knife or spatula, on top, two ends and back. Bottom resting on base of course will be flat, and the face side is not touched. Small grooves are cut in top and side faces. After being coated with separating agent, the piece is placed in its proper location against the model and another application of plaster made in a similar manner on the adjoining area. That piece is removed, squared up, grooved, and put back against the model. That procedure is continued until the whole model is covered. Then the pieces are removed from the model and reassembled for use. If several cast objects (statues) are to be made at the time or in the future, the sectional mold is used for production of wax replicas from which actual molds are made. In that method the sectional mold is carefully assembled and tied together in any suitable fashion. The cavity is filled with molten wax, and left for a short period of time, depending upon the desired thickness of metal wanted in the casting. Liquid portion of wax remaining is poured out, leaving a wax shell in the mold. Sectional mold then is taken apart and the wax shell exposed.

Wax sprues and risers are attached to the shell, and the combination, suitably supported by nails and wires extending into the interior of the shell, which is placed in a container or flask, open side up. Plaster mix is poured around the wax shell and the interior filled also. After the plaster sets, the container is removed and the plaster mold placed in an oven with the open side down. Mold is slowly heated to dry the plaster, and the temperature is raised to melt out the wax. Mold then is ready for pouring of the molten metal.

If only one casting is to be made, the sectional mold may be encased in a layer of plaster to fasten it tightly together, and the assembly baked to drive off the moisture, or the separate sections may be baked, put together and backed up with sand.

As you know, the plaster molding method is an ancient practice, and in the early days considerable secrecy existed on exact ingredients of the plaster mixes. That presumably continues today in those foundries preparing their own materials, but in general most plaster molders either use prepared "casting" plaster essentially consisting of 4 parts by weight of plaster and 1 part fibrous talc or purchase the plaster and talc and mix it together themselves.

As might be expected, plaster mixes reported to have been used vary over a wide range as to ingredients and amounts and include with the plaster such materials as fine silica, brick dust, molding sand, clay, asbestos, luto (crushed used molds), grog, etc. As examples a few of these are mentioned—the various amounts being by volume: 1 plaster and 2 brick-dust; 4 plaster, 1 fireclay and 1 asbestos; 2 plaster, 1 fireclay, 1 asbestos, 1 crushed firebrick, and 1 fine silica.

Loss From Defective Castings

QUESTION We are endeavoring to acquire certain information concerning the operation of a gray iron machinery casting foundry so that we can compare it with our own. We would like to know what is considered a fair average for defective castings at the present time.

ANSWER So far as we can ascertain foundries differ considerably in percentage of defective castings. Estimates run from 3 to 20 per cent. However, we have seen figures as follows: A foundry producing automobile engine castings (70,000 tons per year) averages 4½ per cent of the sales value in foundry defectives and 1½ per cent in customer returns. Another foundry producing castings from a few ounces up to 90 tons in weight (43,000 tons yearly), including agricultural tractors, implements, heavy machinery, electrical machinery, etc., has a total of 5.8 per cent defective castings. A third foundry, of a large electrical manufacturer, indicated a total of defective castings as 7.2 per cent of the value distributed as follows—3.8 per cent after final inspection and 3.4 per cent returns from machining. No reference is given to defectives before final inspection. An automotive foundry showed a 5.4 per cent defective casting loss from all sources on 146,321 castings with 0.8 per cent before cleaning, 3.3 per cent after final inspection, and 1.3 per cent machine shop rejects.

Porosity Appears Under Skin

QUESTION We would like to know if there are available any books or literature on plaster matchplates and patterns using the pressure process. At present we primarily are interested in trying to eliminate the porosity which occurs under the skin of the pattern.

ANSWER At various times articles have been presented dealing with making pressure-cast matchplates in plaster molds, but your problem is something other than actual production of the molds. We assume that the plaster molds you are using are dried thoroughly; otherwise you would observe blowholes, rough surfaces, etc. The fact that the porosity is under the skin of the casting indicates that the aluminum alloy has absorbed gas during melting, or possibly entrained air during pouring.

However, we doubt that it is the latter case if the usual pressure-casting procedure is followed. By that we mean employment of an insulated metal reservoir with a thin asbestos disk over the sprue into the mold. Reservoir is filled with molten metal which is allowed to cool down to the "mushy" stage (around 1130° F), and then a few pounds of air pressure applied which ruptures the disk and forces the metal into the mold. Amount of metal in the reservoir should be slightly in excess of the quantity required to fill the mold and sprue, or air may be entrained.

While that method also aids in permitting absorbed gas to escape, it will not function perfectly, so the metal must be melted under

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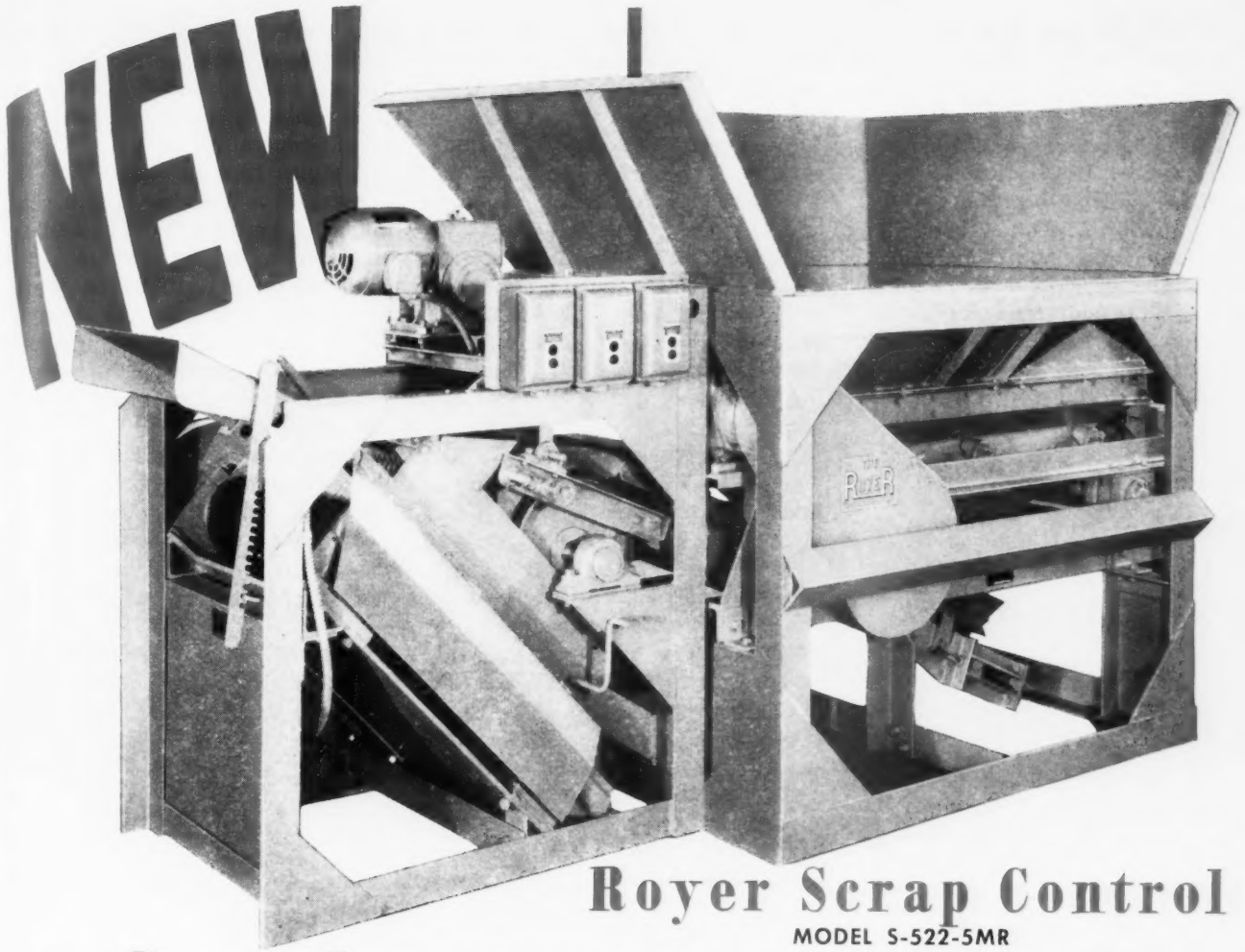


Royer Scrap Control

MODEL S-522-5MR

A *Complete* Sand Conditioning Unit

12% Scrap Loss Reduced to 3%. 44% Man Hour Reduction as a Southern foundry revamps its sand conditioning and installs a new Royer Scrap Control "S-522-5MR" for cleaning and conditioning all sand.

Second in the new Royer Scrap Control series, the "S-522-5MR" is a complete packaged sand cleaning and sand conditioning operation. Designed for floor level operation and front end bucket loader feeding, this unit can be moved from place to place by overhead crane, making it possible to set up the sand conditioning operation wherever needed. With a capacity of 60 tons per hour it can be utilized as a complete sand system, bringing the benefits of semi-mechanization to small and medium sized foundries.

Write for further details on this and other models of the new Scrap Control series.

PROBLEMS:

1. High cost of manually charging sand conditioning equipment
2. Damage to sand conditioning and pattern equipment by tramp iron in the sand
3. A 12% scrap loss

SOLUTION:

Installation of a Model "S-522-5MR" Royer Scrap Control enabled sand to be handled by front end bucket loader, cleaned by shake-out grids and permanent magnet, tempered automatically, mixed, fluffed, cooled and aerated by a Royer Sand Separator and Blender.

RESULTS:

1. 44% of night crew released for other work
2. Equipment and pattern damage eliminated
3. Clean sand uniformly tempered
4. 12% scrap loss reduced to 3%, of which 75% can be salvaged

Foremost in Sand ROYER *Conditioning Equipment*

ROYER FOUNDRY & MACHINE CO. 159 PRINGLE ST. KINGSTON, PA.

(*Concluded from page* 128)

conditions which minimize gas pickup. Use clean, dry metal, and melt in clean pots or crucibles. Melt rapidly, and do not allow the metal to stew in the furnace after melting. Keep the temperature around 1250° F, which should allow sufficient temperature differential to permit skimming, handling to the mold side, and cooling in the reservoir. As an additional precaution it may be well to treat the molten metal with either dry or gaseous degasifying flux.

Skimmer's Life Is too Short

QUESTION We are melting alloy gray iron in high frequency induction furnaces, and we find that the iron skimmers we are using do not last very long because they dissolve too readily in the molten metal. Would a special type of graphite skimmer last longer, or is there some coating we could apply to the iron skimmers which would extend the life?

ANSWER If there is no objection to carbon pick up by the iron, we would expect that a graphite skimmer would function satisfactorily, but of course, it would have to be exposed or immersed the minimum time in the molten metal. In the use of the skimmer we assume you are just employing it to remove or hold back the slag while discharging into the pouring ladle since the stirring action due to "pinch" effect in induction type furnaces eliminates any need for other stirring. Iron skimmers can be protected to a considerable extent by coating with a silica or other refractory wash. Coating must be dried thoroughly before use to prevent introduction of water vapor into the molten metal and spalling or flaking off of the coating.

Coating for Permanent Molds

QUESTION We operate a foundry in South Africa and would like some information on die-casting of brass plumbers' goods such as water taps, bends, etc. Are there any books on the subject? What can we use for spraying the chills before casting the brass?

ANSWER So far as we know there is no book on gravity die casting, which in this country is called permanent mold casting. While many firms employ that practice for aluminum alloys, the application is not so widely used for copper-base alloys.

As might be expected, a wide variety of materials is employed for coating molds which perform two functions. One, of course, is protection of the mold face, and the other is to control the chill effect of the mold. The latter is effected by the thickness of the mold coating. Where rapid cooling of the casting section is desired the mold coating is made as thin as possible but still thick enough to protect the mold face, and where less rapid cooling is desired the mold coating is thicker.

Numerous proprietary mold coating materials are available on the market, and we suggest one of those rather than trying to develop your own.

Coatings usually include some refractory material such as china clay, red talc, French chalk, mica, whiting, aluminum oxide, etc. with or without about 5 per cent sodium silicate to keep them in suspension in water. Rouge or graphite also may be added. One mixture, for example, contains 1 gal water which is raised to the boiling point, and to this is added while still boiling, 12 oz of 40 per cent sodium silicate, 10 oz whiting and 1 oz powdered graphite or rouge. Solution is cooled and stirred well before use. Molds are heated just sufficiently that the coating when sprayed on (or brushed on) will dry without boiling. Coating is applied in thin layers.

How To Color Brass Castings

QUESTION We would like to have information on how brass castings may be provided with an oxidized finish.

ANSWER We assume that your inquiry refers to coloring brass castings after machining to give them the appearance of bronze. In that case the castings must be degreased thoroughly by placing them in a boiling caustic soda solution containing 5 lb soda to 100 lb (12 gal) of water. Be careful not to get any of the solution on the hands, face or eyes. Length of time for cleaning will vary, but 15 minutes immersion should do the job. After degreasing, the castings should be washed thoroughly in running water at room temperature.

Castings then are pickled for 5 minutes in a nitric acid bath containing 1 part commercial acid to 50 parts water by volume. Observe same precautions as previously mentioned for the caustic. Rinse castings thoroughly in running water and transfer immediately to the coloring bath composed of the commercial 20 per cent ammonium sulphide diluted with an equal amount of water. Immersion time will vary with the temperature of the solution and the desired color. Casting is rinsed in hot water and dried in sawdust.

Producing Hard Sand Matches

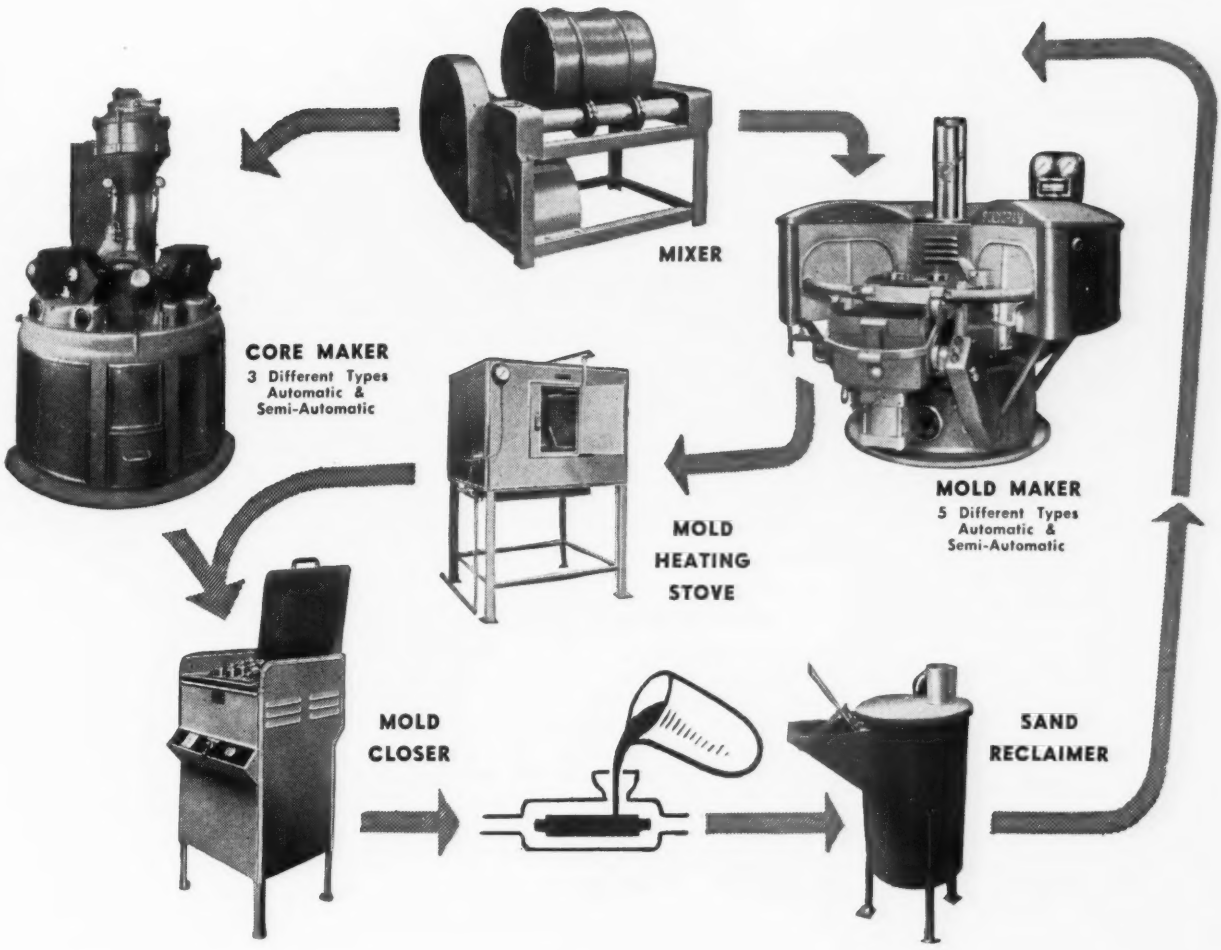
QUESTION We are interested in acquiring a good formula for making hard sand matches using litharge sand and linseed oil which will hold up for a normal production run.

ANSWER We believe you will be much farther ahead by purchasing a proprietary material for forming your hard sand matches. Such a material, known usually as pattern compound, will give consistent results when used according to the manufacturer's directions, and the same cannot always be said for the home-made variety. The latter offer too much temptation to experiment and provide opportunities for carelessness in compounding. As far as those are concerned, there probably are as many different formulas as foundrymen that use them, but the two following are claimed to give satisfactory results:

One-half dry burnt sand is mixed with one-half dry new molding sand. Forty parts of the dry material is mixed with 1 part litharge, and sufficient linseed oil is added to give the consistency of a workable molding sand. Another uses new dry molding sand to which is added an oil-litharge mix to give it the feel of well-tempered molding sand. The oil-litharge mix is composed of 8 parts by weight of boiled linseed oil and 1 part litharge. With both compositions, after the match has been made, it is set in a warm place for 24 hr and then given a coat of shellac.

The Polygram SHELL MOLDING

PRODUCTION CYCLE . . .



Agents Wanted

We shall be glad to consider applications from well established foundry supply companies for limited area agency appointments throughout the U. S. A. Please state in first letter full details—technical resources, area covered, etc.—and mark envelope "For the personal attention of Sales Director".

With over eight years' experience and research behind them, a staff of trained technicians and with associated companies in the British Commonwealth and Europe, POLYGRAM are in a unique position to offer the best and latest development in the shell molding equipment field. This, for example, is the first integrated range of machines to be supplied to the foundry trade.

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Polygram FOR SHELL MOULDING

MEN OF INDUSTRY

CARL F. BARCHFELD

. . . joins Crucible Steel

ARTHUR TAUSCHER

. . . joins Cooper Alloy

PAUL A. PIERCE

. . . Continental Foundry mgr.

LESLIE G. GRAPER

. . . Fairbanks Morse, sup't

CARL F. BARCHFELD has been named sales manager, Crucible Steel Casting Co., Cleveland. For 27 years he has been associated with Commercial Steel Casting Co., Marion, O., and previously was with American Steel Foundries in Pittsburgh and Verona, Pa. Active in the Steel Founders' Society of America, Mr. Barchfeld served as a national director 1950-53, and as vice president in 1952 and 1953.

♦ ♦ ♦

Robert J. Ely, formerly process metallurgist, American Brake Shoe Co., New York, has been appointed assistant chief metallurgist with headquarters at the company's Research Center, Mahwah, N. J. A graduate of Massachusetts Institute of Technology, he joined the company in 1945.

♦ ♦ ♦

Samuel H. Cleland, Michigan manager, Eastern Clay Products Department, International Minerals & Chemical Corp., Chicago, has retired, following 31 years with the company. His son, **Robert Cleland,** formerly district sales manager, has succeeded him. **W. Adams,** formerly sales service engineer in Michigan, has been assigned to special products on a national basis.

♦ ♦ ♦

Jack C. H. Stearns, for 10 years manager of ingot sales for the magnesium department, Dow Chemical Co., Midland, Mich., has been named an executive of Dow Chemical Export Co., Dow Chemical International Ltd., and Dow Chemical Inter-American Ltd. Mr. Stearns attended Johns Hopkins University and was graduated from George Washington University. He joined the Dow company in 1937 and was engaged in magnesium sales until 1944.

Arthur Tauscher has joined Cooper Alloy Foundry Co., Hillside, N. J., as plant engineer in charge of maintenance and construction. A graduate of New York University in 1942, Mr. Tauscher's background includes responsibility for general plant operations, maintenance supervision, construction, and allied purchasing activities.

♦ ♦ ♦

Paul A. Pierce, formerly manager of foundries, Continental Foundry & Machine Co., East Chicago, Ind., has been appointed manager of operations. Mr. Pierce joined the company in 1920 as a patternmaker, after a period of employment in the pattern department, Inland Steel Co., East Chicago.

♦ ♦ ♦

Roy F. Hancock, assistant to the vice president-sales, has been made assistant vice president, Vanadium Corp. of America, New York. Mr. Hancock was graduated from Pennsylvania State University in 1933 and joined Vanadium in 1950. **Frederick F. Franklin** has been appointed assistant manager of the company's Cleveland district office. Formerly he was manager of the company's transportation development division in Chicago. During World War II he served with NPA and other government agencies.

♦ ♦ ♦

John Taylor, formerly vice president, Lester B. Knight & Associates, Chicago, has returned to Norris & Elliott Inc., Columbus, O., as vice president. Prior to joining the Knight organization in 1950, Mr. Taylor was associated with Norris & Elliott for 14 years. He will be located in its Chicago office where he will be responsible for a foundry division he developed for the company.

Leslie G. Graper, superintendent of the new foundry recently opened by Fairbanks, Morse & Co. at its Kansas City, Kans., works, has been associated with the company for nearly six years. Prior to his transfer to Kansas City he was chief metallurgist and supervisor of foundries for Fairbanks, Morse at Beloit, Wis. Mr. Graper was graduated from the University of Illinois in 1943 and served three years with the Army. He was with Liberty Foundries Co., Rockford, Ill., before joining Fairbanks, Morse.

♦ ♦ ♦

Ray T. Hanson has been named western manager of the Borden Co.'s Chemical Division. He succeeds **William R. Moffitt,** who recently became a vice president and technical director of the division. Mr. Hanson joined Borden in 1953 and formerly was assistant manager of Borden's West coast operations.

♦ ♦ ♦

Howard F. Park Jr. has been elected vice president-sales, General Steel Castings Corp., Granite City, Ill. **J. Harvey Johnston** has been named vice president, **R. T. Risk**, treasurer, and **G. K. Hoblitzelle,** secretary.

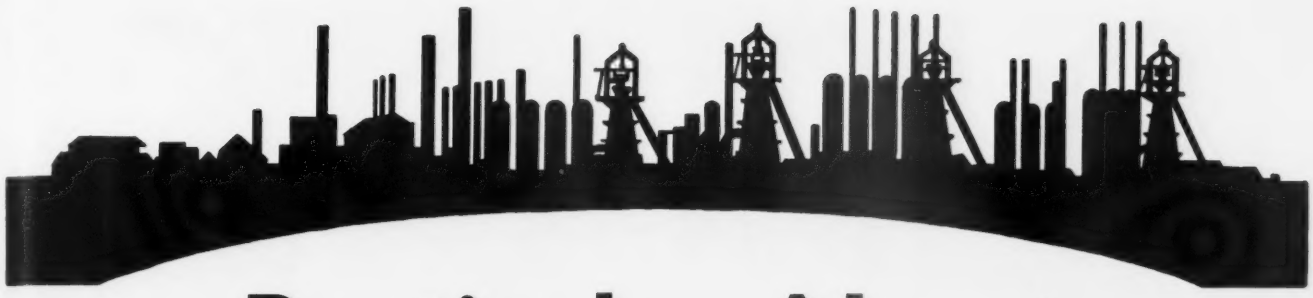
♦ ♦ ♦

W. A. DeRidder has resigned as chairman of the board of directors, General Metals Corp., Los Angeles and Oakland, Calif., but will continue as a company consultant.

♦ ♦ ♦

James A. McGowan, since 1951 assistant product manager for sand and permanent mold castings at the Vernon, Calif., works, Aluminum Co. of America, Pittsburgh, has been named assistant sales manager of New York district. A graduate of Iowa State University, he joined Alcoa in 1936.

(*Continued on page* 134)



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609 Bona Allen Building, Atlanta 3, Ga.; 230 North Michigan Avenue, Chicago 1, Ill.; First National Building, P. O. Box 538, Cincinnati 1, Ohio; 1154 Union Commerce Building, Cleveland 14, Ohio; 1203 Ford Building, Detroit 26, Mich.; P. O. Box 335, Duluth 1, Minn.; 412 Guaranty Building, Indianapolis 4, Ind.; 407 Foshay Tower, Minneapolis 2, Minn.; 70 Pine Street, New York 5, N. Y.; 1500 Walnut Street Building, Philadelphia 2, Pa.; 1910 Clark Building, Pittsburgh 22, Pa.; 796 Arcade Building, St. Louis 1, Mo.

Woodward Iron Company

WOODWARD, ALABAMA

Independent Since 1882

MEN OF INDUSTRY

BYRON E. KENNEL
. . . FOUNDRY editorial staff

WILLIAM JOST
. . . National Malleable supt.

RICHARD UTZ
. . . malleable division supt.

A. E. SCHAUER
. . . heads Cleveland NFFS group

(*Continued from page* 132)

William F. Courter, since 1952 in the Los Angeles district sales office, has succeeded Mr. McGowan at the Vernon works.

♦ ♦ ♦

Byron E. Kennel has been made assistant editor of FOUNDRY. Mr. Kennel was graduated from the University of Alabama in 1950 with a degree in Industrial Engineering (foundry option). Following graduation he was employed by Superior Foundry Inc., Cleveland, first as an engineering trainee and later as a service engineer making customer contacts. Before entering the University of Alabama Mr. Kennel served in the Navy as a metalsmith.

♦ ♦ ♦

George H. Morel has been appointed district engineer for the construction and maintenance department in the Chicago area, American Brake Shoe Co., New York. Mr. Morel, with the company 12 years, was formerly division plant engineer and safety director with Brake Shoe's National Bearing Division, St. Louis.

Richard Utz and **William Jost** have been named general superintendents of the malleable and steel divisions, respectively, Chicago Works, National Malleable & Steel Castings Co., Cleveland. Mr. Utz, who joined the Indianapolis plant in 1932, after graduation from Rose Polytechnic Institute, was transferred to the Melrose Park, Ill., plant in 1943, where he became foundry superintendent. Since 1951 he has been assistant general superintendent, Chicago Works. Mr. Jost, with the company since 1939, was assistant chief inspector, Melrose Park, and following Navy service was transferred to Chicago Works in 1946, where he was service engineer, assistant sales manager, and until recently chief inspector.

♦ ♦ ♦

Norman B. Pilling, since 1939 director of the Bayonne, N. J., Research Laboratory, International Nickel Co., New York, has been named assistant to the vice president-manager of the company's Development and Research Division. He joined the company in 1924. **Dr. W. Andrew Wesley,** since 1939 assistant director of the Bayonne laboratory, has succeeded Mr. Pilling as its head, with title of manager. He has been with International Nickel since 1926. **Dr. John T. Eash,** for 4 years metallurgical supervisor and head of the ferrous castings section of the laboratory, has become assistant manager. He joined the Bayonne laboratory in 1931.

♦ ♦ ♦

A. E. Schauer, elected chairman of the Cleveland Chapter of the Non-Ferrous Founders' Society for the current year, is co-owner of Schauer Bronze & Aluminum Foundry Co., Cleveland, which he organized with his brother in 1939. During high school vacations he worked in his father's small foundry and later studied mechanical engineering at Fenn College.

♦ ♦ ♦

Kenneth O. Williamson, assistant sales manager, Osgood-General, Marion, O., has been named sales manager, succeeding **James S. Fortiner,** resigned. Mr. Williamson joined the

(*Continued on page* 136)

GEORGE H. MOREL
. . . Brake Shoe engineer

NORMAN B. PILLING
. . . Research Division, INCO

DR. W. ANDREW WESLEY
. . . heads research laboratory

DR. JOHN T. EASH
. . . Bayonne Research Laboratory

There's a lot you can't see...

when you look at a **PAYLOADER®** tractor-shovel.

YOU CAN'T SEE the 34 years of pioneering experience in building hydraulic tractor-shovels — MORE experience than all others combined!

YOU CAN'T SEE the millions of dollars of parts and service facilities which more than 300 "PAYLOADER" Distributors maintain for their customers' convenience.

YOU CAN'T SEE that 90% of all the "PAYLOADER" tractor-shovels built in the last fifteen years are still in service!

YOU CAN'T SEE the more than 22,000 "PAYLOADER" units throughout the world — more than all others combined!

YOU CAN'T SEE the quality of hidden parts which are built more carefully, to more rigid specifications and with more "know-how" than any other.

The Overwhelming Preference for "PAYLOADER" tractor-shovels is the result of *proven* performance and customer *satisfaction.* Ask any owner or operator.

For complete information contact your "PAYLOADER" Distributor or write to The Frank G. Hough Co., 703 Sunnyside Ave., Libertyville, Illinois.

PAYLOADER®
THE FRANK G. HOUGH CO. · LIBERTYVILLE, ILL.
SUBSIDIARY—INTERNATIONAL HARVESTER COMPANY

MEN OF INDUSTRY

F. B. DOANE
. . . Magnaflux Corp. chairman

CARL E. BETZ
. . . vice chairman, Magnaflux

W. E. THOMAS
. . . Magnaflux executive v. p.

CHARLES R. GREGG
. . . S. California chairman

(*Continued from page* 134)
company in 1941 and previously served as division sales manager in several territories.

♦ ♦ ♦

Theodore D. Trackler, for the past year personnel manager in the permanent mold and magnesium plants, Aluminum Co. of America, Cleveland, has joined the personnel department staff in Pittsburgh. Mr. Trackler joined the company in 1925 and worked in the forge, sand foundry and ingot plants until 1937 when he was assigned to personnel work. **James Lyle,** in the permanent mold plant's industrial engineering department, has succeeded Mr. Trackler. He has been with Alcoa since 1951.

♦ ♦ ♦

N. C. Wiggin has been appointed advertising-sales promotion manager, J. H. France Refractories Co., Snow Shoe, Pa. Mr. Wiggin attended University of Pittsburgh and Bethany College and was previously associated with advertising and sales promotion for Rockwell Mfg. Co. and Westinghouse Electric Corp., Pittsburgh.

F. B. Doane was recently elected chairman of the board of directors, Magnaflux Corp., Chicago, in addition to the duties of president which he assumed in 1944. Mr. Doane was one of the founders of the company 25 years ago. **Carl E. Betz,** since 1946 executive vice president, has been named vice chairman of the board. **W. E. Thomas,** who since 1946 has been vice president-sales, has become executive vice president, and **Wylie D. Reid Jr.,** 2nd vice president-plant manager, has also been appointed treasurer.

♦ ♦ ♦

William J. Fabish has been appointed eastern representative, Hammond Machinery Builders Inc., Kalamazoo, Mich., to handle the company's line of dust collectors, grinding, polishing, buffing and deburring machinery. Mr. Fabish has been serving the metalworking industry in the East for 12 years.

♦ ♦ ♦

C. L. Thompson has been appointed sales manager, Material Handling Division, the Buda Co., Harvey, Ill., division of Allis-Chalmers Mfg. Co., Milwaukee. Mr. Thompson, a graduate of University of Chicago, joined the Buda Co. in 1952, where he became assistant general manager of its California branch and more recently Oregon branch manager.

♦ ♦ ♦

Charles R. Gregg, new chairman of the Southern California Chapter of the AFS for 1954-55, is president-general manager, Gregg Iron Foundry, El Monte, Calif., which he organized in 1946. Mr. Gregg attended Long Beach Junior College and University of California and became associated with Reliance Regulator Division, American Meter Co., Alhambra, Calif., where until 1937 he was a molder, and successively foundry division foreman and foundry superintendent. He was vice chairman of the Southern California Chapter last year.

♦ ♦ ♦

Joseph J. Carr, until recently associated with Bantam Bearings Division, Torrington Co., South Bend, Ind.,
(*Continued on page* 139)

N. C. WIGGIN
. . . joins France Refractories

WILLIAM J. FABISH
. . . Hammond Machinery sales

C. L. THOMPSON
. . . div. sales mgr., Buda Co.

JOSEPH J. CARR
. . . joins Bay State Abrasive

STRAIGHTEN OR COIN MALLEABLE IRON CASTINGS ON THE VERSATILE CECOSTAMP

Straightening malleable iron castings has been modernized, speeded up and rejects almost eliminated in a number of foundries by the installation of Cecostamps, replacing old-fashioned strap hammers or board drop hammers. The Cecostamp's blow is instantly controllable by the operator. Misalignment is practically unheard-of—due to the rigid construction of the Cecostamp. There are no time-consuming "friction" or stroke adjustments. Production is high. Maintenance costs are low. Operation is very simple and where very tiring on other types of hammers used formerly, there is little fatigue on the part of the operator with the Cecostamp.

Write for complete details on the Chambersburg CECOSTAMP

Cecostamp straightening malleable iron castings at large foundry in Canada. Board drop hammer was formerly used for this work, requiring stoppage for adjustments and stroke set-up. Cecostamp permits almost continuous operation.

Cecostamp coining malleable iron castings in foundry of implement manufacturing company. Formerly done on a strap hammer, production has been speeded up and accuracy insured.

CHAMBERSBURG ENGINEERING COMPANY • CHAMBERSBURG, PENNA.

CHAMBERSBURG

THE HAMMER BUILDERS

"I'll get to BUFFALO ANY WAY ...to get those BETTER BUFFALO PATTERNS"

They come by train, by plane, by car,
They come from near, they come from far,
Cause foundry men who really know,
Buy *better* patterns from "Buffalo."

Our Engineers plan through and through,
Details of every job we do,
And Craftsmanship that can't be beat,
Produces patterns oh so sweet.

With you our patterns make a hit,
Because your foundry they will FIT,
With extra rigging you're not caught,
And adapting, don't give it a thought.

Production schedules really climb,
You get profitable peace of mind,
Scrap ratios almost disappear,
When *you* need patterns, GET 'EM HERE.

Production and Experimental Pattern Equipment • Shell Mold Pattern Equipment and Engineering • Wood and Plastic Models • Jigs, Templates and Target Fixtures • Permanent Molds • Forging and Stamping Dies • Dies for Injection and Reinforced Plastics Molding • Special Precision Parts • Special Machinery and Tooling • Metallizing • Engineering Drawing Service

Formerly

BUFFALO PATTERN WORKS, INC.

NO CHANGE IN MANAGEMENT OR OWNERSHIP

BUFFALO PATTERN CORPORATION

832 HERTEL AVE., BUFFALO 16, N. Y.

DESIGNERS AND MANUFACTURERS OF PATTERN EQUIPMENT FOR OVER HALF A CENTURY

(*Continued from page* 136)
has been appointed midwest area field engineer, Bay State Abrasive Products Co., Westboro, Mass., with headquarters in Chicago.

♦ ♦ ♦

Frank L. Perrin, for the last six years manager of the Baltimore district office of the General Electric Co. X-Ray department, has been named manager of the department's Chicago office. He succeeds **Robert A. Mills,** who is retiring at age 65 after nearly 48 years of service. Mr. Mills had been manager of the Chicago office for 19 years. **John W. Davidson** has been advanced to manager of the department's Baltimore district office, succeeding Mr. Perrin. Mr. Davidson has been associated with the company for 24 years, recently as senior salesman in Philadelphia.

♦ ♦ ♦

Jules F. Boand Jr., for the past year on the home office sales staff, Titanium Metals Corp. of America, New York, has been named Pacific coast manager of sales and technical service with headquarters in Los Angeles. Mr. Boand was graduated from Illinois Institute of Technology in 1948, and for 5 years was a sales engineer, National Lead Co., Chicago.

♦ ♦ ♦

W. Beckhardt has been appointed technical sales representative in the Norristown, Pa., area for Oakite Products Inc., New York, manufacturer of industrial cleaning and metal treating materials. Mr. Beckhardt was formerly with Eastern Tank Maintenance Co., Philadelphia.

♦ ♦ ♦

C. J. Chapman has been named general sales manager of industrial products, National Carbon Co., division of Union Carbide & Carbon Corp., with headquarters in the New York home office. A graduate of Dartmouth College he joined the company in 1936 as eastern district salesman and transferred to Pittsburgh district in 1937. After serving as assistant manager in Atlanta and New York, he become Atlanta division manager in 1948 and since 1951 has been Chicago district sales manager.

WILLIAM E. ECCLES, appointed foundry superintendent, Cooper-Bessemer Corp.'s Grove City, Pa., plant, following 26 years with the company and 12 years as assistant foundry superintendent, as reported in August *Foundry*

♦ ♦ ♦

Charles W. Glunk has been appointed A. P. Green Fire Brick Co.'s district sales manager in Richmond, Va. A graduate of Purdue University, Mr. Glunk has been sales engineering supervisor in the company's home office, Mexico, Mo. **Richard Olson,** a graduate of Carnegie Institute of Technology, and in sales work for many years, has been made district sales manager in the Baton Rouge, La., office opened recently by the company.

♦ ♦ ♦

W. C. Willard, since 1952 staff assistant in the Memphis, Tenn., office, Corn Products Sales Co., New York, has been appointed manager of the company's Houston, Tex., office. Mr. Willard joined the company in 1941 as salesman in Arkansas and Oklahoma, following graduation from Stanford University. After military service he returned to the southern division as bulk product salesman. Mr. Willard replaces **Paul C. Murphy,** who will retire soon. With the company 36 years, Mr. Murphy has been Houston office manager since 1926.

♦ ♦ ♦

Matthew J. Delehaunty has been appointed manager of commodity sales for the mechanical goods division, United States Rubber Co., New York. Manager of industrial sales for the past year, he will combine functions of both offices in his new post. Mr. Delehaunty joined the company in 1922 and succeeds the late **Harry M. Frecker** as manager of commodity sales.

♦ ♦ ♦

W. H. Pender has been appointed manager of belting sales for Quaker Rubber Corp., Division of H. K. Porter Co. Inc., Philadelphia. Mr. Pender, with Quaker since 1947, was previously field engineer for conveyor and elevator belting. A graduate of the University of Akron, Mr. Pender will, in his new position, co-ordinate the activities of factory and field personnel in all phases of belting sales.

♦ ♦ ♦

William H. Oliver, elected chairman of Western New York Chapter of the American Foundrymen's Society for 1954-55, since 1948 has been general superintendent of the Bond Plant, American Radiator & Standard Sanitary Corp., Buffalo. Following graduation from Yale University in 1933 he became associated with Jones & Laughlin Steel Corp., Aliquippa, Pa. He was plant engineer, A. W. Cadman Mfg. Co., Pittsburgh, from 1936 to 1938, when he joined the engineering department, Louis-

(*Continued on page* 142)

C. J. CHAPMAN
. . . National Carbon sales mgr.

CHARLES W. GLUNK
. . . refractories sales mgr.

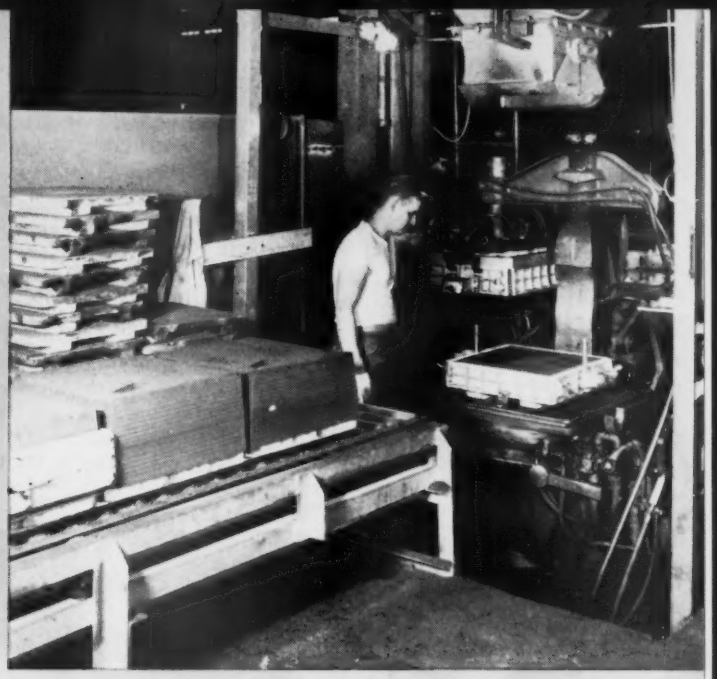
W. C. WILLARD
. . . Corn Products, Houston

WILLIAM H. OLIVER
. . . W. New York chairman

ONE MAN...
ONE OSBORN ROTA-LIFT
turn out twice as many molds per manhour

New high quality . . . new low cost *on these pipe couplings for high pressure service. Castings are of uniform size . . . uniform quality. Production is consistent throughout the day.*

Fills Drag—Rota-Lift will jolt the drag, then pick up the flask on split trunnions enabling the operator to roll-over the flask.



Opens Mold after cope has been squeezed and drawn by Rota-Lift. The pattern is then removed from the drag.

ROTA-LIFT...the molder's helper

- ***ELIMINATES HEAVY MANUAL LIFTING***
- ***SIMPLIFIES MOLD PRODUCTION***
- ***IMPROVES FOUNDRY EFFICIENCY***

HERE'S a picture of one man—one Osborn Rota-Lift turning out 160 top-quality molds daily. It used to take two operators. Molds are uniform in density . . . have high dimensional accuracy for pressure-tight joint castings.

Cost per mold is less than heretofore possible.

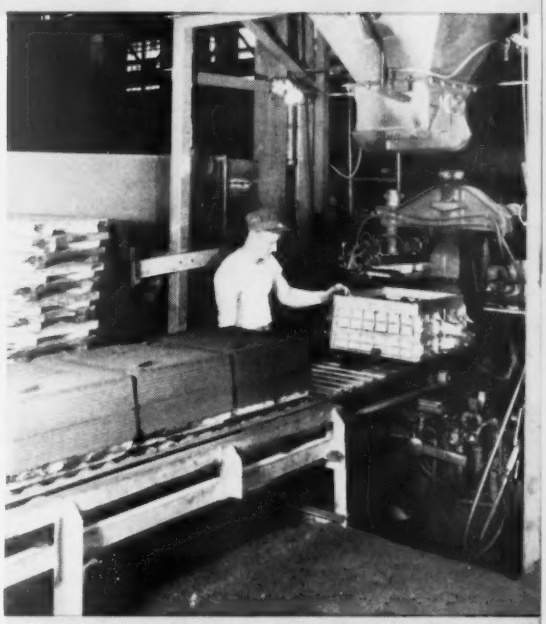
It's easier to maintain uniform foundry schedules day in and day out with Osborn Rota-Lift. That's because Rota-Lift mechanically handles the mold . . . reduces heavy lifting and operator fatigue that used to limit the size of match-plate patterns.

How much can Rota-Lift cut your costs? Have an Osborn foundry specialist look over your work . . . show you how to simplify molding . . . eliminate costly operations. Write The Osborn Manufacturing Company, 5401 Hamilton Avenue, Cleveland 14, Ohio.

OSBORN

CORE BLOWERS MOLDING MACHINES

Another example of Osborn leadership and advanced engineering



Rolls Away the finished mold, after the Rota-Lift has closed the mold and suspended it for easy positioning of conveyor.

Removes Flask from the finished mold before returning to the Rota-Lift for the next mold.

MEN OF INDUSTRY

(*Continued from page* 139)

ville Works, American Radiator & Standard Sanitary Corp. In 1946, following six years of service with Army Engineers, Mr. Oliver returned to the Louisville Works as assistant to the superintendent of the enameled iron department. He was vice chairman of Western New York Chapter last year.

♦ ♦ ♦

E. C. Hansen has been appointed manager of the Buffalo office recently opened by C. O. Bartlett & Snow Co., Cleveland. Mr. Hansen, who joined the Cleveland office following graduation from Case Institute of Technology in 1951, will also handle sales of foundry equipment in Niagara Falls, Schenectady, Rochester, and western New York.

E. C. HANSEN
. . . *Bartlett & Snow, Buffalo*

C. J. SCHMIDT
. . . *Ross Engineering v. p.*

GENE A. ZWERNER
. . . *Link-Belt, Washington*

JAMES N. WESSEL
. . . *heads Washington Chapter*

♦ ♦ ♦

Charles M. George, since 1950 sales administrator, Gardner-Denver Co., Quincy, Ill., has been appointed assistant to the president. He has been with the company 25 years. **J. W. Gardner,** with Gardner-Denver since 1947, and recently elected a director, has become administrative assistant. **B. P. Spann,** who joined the company 20 years ago, has been elected vice president. **George W. Gutekunst,** formerly Los Angeles district manager, has been transferred to Quincy as general sales manager. He joined the sales force in 1937.

♦ ♦ ♦

J. E. M. Wilson, formerly vice president and manager of the mining division, Jeffrey Mfg. Co., Columbus, O., has been appointed vice president-sales. **Harker Hittson,** patent counsel, has been elected a director. The following division general sales managers have been appointed: **A. R. Anderson,** mining; **Lincoln Kilbourne,** conveyor; and **J. B. McNaughton,** special products.

William H. Brandt has retired as assistant secretary, Chain Belt Co., Milwaukee, following over 44 years with the company. **W. E. Schauer** has succeeded Mr. Brandt in the position.

♦ ♦ ♦

C. J. Schmidt, for 20 years in charge of the Detroit office, J. O. Ross Engineering Corp., has been named vice president-sales with headquarters in the main office, New York. A graduate of University of Wisconsin, Mr. Schmidt joined the company in 1930.

Gene A. Zwerner has been appointed Washington district manager, Link-Belt Co., Chicago, succeeding **C. R. Heller,** who has retired after representing the company there since 1947. A graduate of Rose Polytechnic Institute, Mr. Zwerner also attended George Washington University. For 4 years he was sales manager for Link-Belt Africa Ltd., company subsidiary in Springs, Transvaal, Union of South Africa. He joined Link-Belt in 1946.

♦ ♦ ♦

Alan D. Dauch has been appointed vice president-sales, Salem-Brosius Inc., and of its recently acquired subsidiary, George J. Hagan Co., Pittsburgh. **John W. Holzwarth,** company sales manager for heavy heating furnaces, has headquarters at the general offices in Salem, O. **Charles H. Schwerin** has been named sales manager of rotary hearth furnaces and heat treating furnace equipment at the George J. Hagan Co. offices, Pittsburgh. **Ward A. Wickwire Jr.** is president of the two companies. Sales representatives appointed to handle furnace equipment include: **Joseph Sandberg,** Detroit; **L. C. Powell,** Ft. Wayne, Ind.; **W. T. Bosworth,** Chicago. Ralph B. Kraft Co., Chicago, handles midwest mechanical equipment sales; **E. A. Wilcox,** San Francisco, Los Angeles and Seattle, and W. P. Woolridge Co., San Francisco, represent the company on furnace equipment.

♦ ♦ ♦

James N. Wessel, who has been elected 1954-55 chairman of the Washington Chapter of the AFS, is supervisory production metallurgist and assistant to the chief of laboratories, Puget Sound Naval Shipyard, Bremerton, Wash. Mr. Wessel was graduated from Michigan College of Mining and Technology in 1933 and was associated with Ingersoll Steel & Disc Division of Borg-Warner Corp. until 1934 when he joined Campbell, Wyant & Cannon Foundry Co., Muskegon, Mich. He became assistant metallurgist and melting superintendent there and in 1939 became associated with Mare Island Naval Shipyard, Vallejo, Calif. He was transferred to the Puget Sound Shipyard in 1940 as associate metallurgist. Mr. Wessel was vice chairman of Washington Chapter last year.

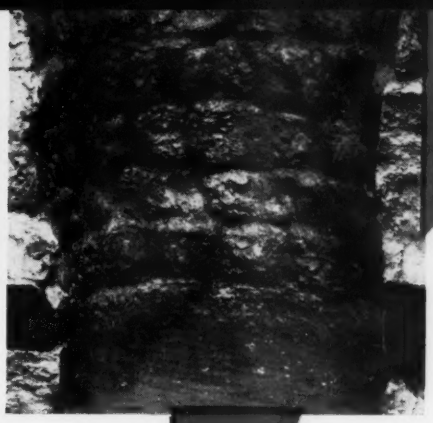
♦ ♦ ♦

William H. Feathers, since 1952 assistant to the vice president-production, National Carbon Co., division of Union Carbide & Carbon Corp., New York, has been appointed vice president-general manager of industrial products. Mr. Feathers joined the company at Niagara Falls in 1937 following graduation from Virginia Polytechnic Institute.

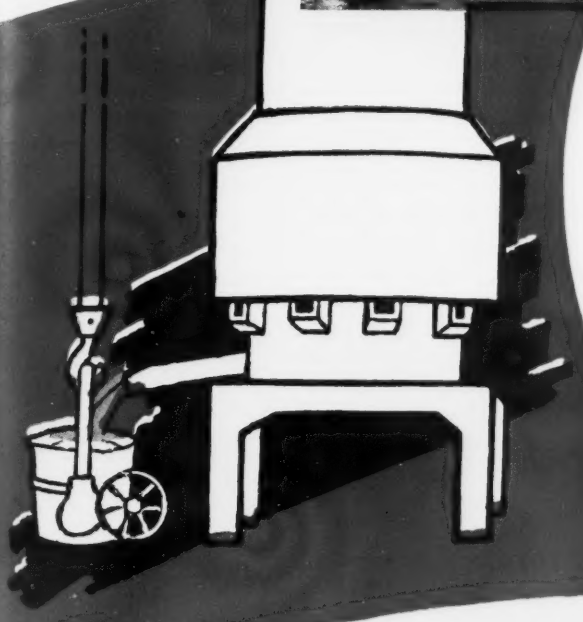
♦ ♦ ♦

Howard A. Acheson has been elected president-director, Gredag Inc., Niagara Falls, N. Y., succeeding **Daniel W. Streeter,** resigned. **William M. Ewart,** with the company 31 years, was named vice president, **John C. Sprague,** secretary-treasurer and director, and **Mrs. Hazel M. Ewart** as-

(*Concluded on page* 144)



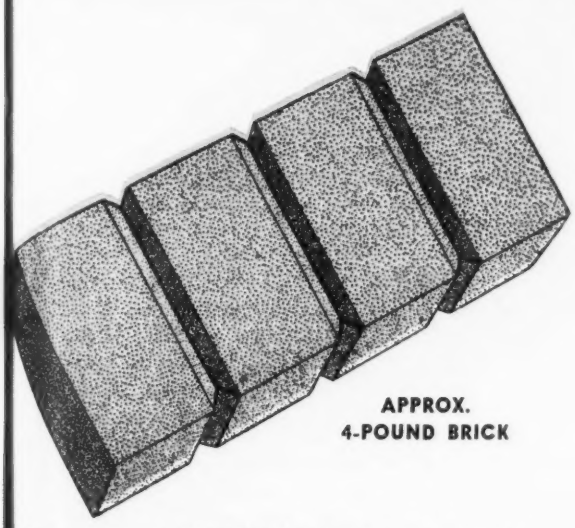
CLEAN CUPOLA
Maintenance
Practically Nil



KEEPS CUPOLAS CLEANER

While cleansing molten iron for better castings.

Famous CORNELL CUPOLA FLUX



APPROX.
4-POUND BRICK

Made in Pre-Measured SCORED BRICK FORM. Only a few seconds of labor is involved in fluxing each charge of iron.

For over thirty-six years, Famous Cornell Cupola Flux has been endorsed by leaders in the industry (both gray iron foundries and malleable foundries with cupolas) for its commendable job of conditioning molten iron for better castings—and keeping cupolas cleaner for highest efficiency in operation and lowest maintenance cost.

Famous Cornell Cupola Flux not only purges molten iron of impurities but makes it hotter, more fluid and reduces sulphur (many times) to practically nothing. The result: castings are cleaner, sounder and easier to machine.

Cupola Drops are cleaner. Digging out is practically eliminated. Cupola linings are protected by a glazed or vitrified surface which is formed on stone or brick—there is less erosion and repairs.

WRITE FOR BULLETIN NO. 46-B

The Cleveland Flux Co.

1026-1040 MAIN AVENUE, N. W., CLEVELAND 13, OHIO

Manufacturers of Iron, Semi-Steel, Malleable, Brass, Bronze, Aluminum and Ladle Fluxes – Since 1918

FAMOUS CORNELL FLUXES
Trade Mark Registered

BRASS FLUX

FAMOUS CORNELL BRASS FLUX cleanses molten brass even when the dirtiest brass turnings or sweepings are used. You pour clean, strong castings which withstand high pressure tests and take a beautiful finish. The use of this flux saves considerable tin and other metals, and keeps crucible and furnace linings cleaner, adds to lining life and reduces maintenance.

ALUMINUM FLUX

FAMOUS CORNELL ALUMINUM FLUX cleanses molten aluminum so that you pour clean, tough castings. No spongy or porous spots even when more scrap is used. Thinner yet stronger sections can be poured. Castings take a higher polish. Exclusive formula reduces obnoxious gases, improves working conditions. Dross contains no metal after this flux is used.

MEN OF INDUSTRY

(*Concluded from page* 142)

sistant secretary-assistant treasurer. **M. W. Reynolds** was also elected a director.

♦ ♦ ♦

Robert D. Cleaves has been appointed general sales manager, Anderson Brass Works Inc., Birmingham. For the last 13 years Mr. Cleaves was associated with Line Material Co., Milwaukee.

♦ ♦ ♦

John A. Van Haver, chairman of the Western Michigan Chapter of the AFS for the current year, since 1949 has been foundry manager, Sealed Power Corp., Muskegon, Mich. In 1935 he was appointed metallurgist, Grand Haven Brass Foundry, Grand Haven, Mich. Subsequent associations include foundry metallurgist, Sealed Power Corp.; general foreman, U. S. Pipe & Foundry Co., Chattanooga, Tenn., and foundry superintendent, Worthington Corp., Harrison, N. J. Mr. Van Haver was vice chairman of the Western Michigan Chapter last year, and is a former director of the Metropolitan Chapter of the AFS.

JOHN A. VAN HAVER
. . . W. Michigan chairman

♦ ♦ ♦

Carl M. Loeb Jr. has resigned as vice president-sales and research, Climax Molybdenum Co., New York, but will remain as a director and chief technical adviser. Mr. Loeb joined Climax in 1932 as research assistant, later becoming district sales manager in New York. In 1937 he was named vice president-sales development and a director in 1948.

♦ ♦ ♦

Alfred A. Diebold, vice president-operations, Atlas Steel Casting Co., Buffalo, has also been placed in charge of sales.

♦ ♦ ♦

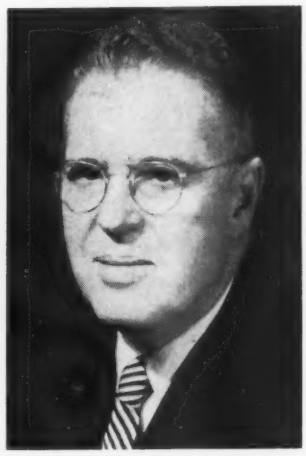
Herbert J. Cutler Jr. has joined American Fire Clay & Products Co., Canfield, O., as sales engineer. A graduate of Mount Union College, for the last 6 years he was plant metallurgist, American Radiator & Standard Sanitary Corp., Buffalo.

♦ ♦ ♦

Wayne J. Burke has joined Eastern Clay Products Department, International Minerals & Chemical Corp., Chicago, to head up service and development of the Taccone molding machine. Mr. Burke attended Drake University and spent 2 years with H. Kramer & Co., Chicago, prior to joining Davenport Machine & Foundry Co. 12 years ago, where recently he was sales manager.

WAYNE J. BURKE
. . . joins Eastern Clay Dept.

Robert B. Wittenberg has been elected a vice president, Great Lakes Carbon Corp., New York, and general manager of its Electrode Division. Since 1951 Mr. Wittenberg has been general manager of the Chemical Division, General Tire & Rubber Co., Akron, O. A graduate of Yale University, he was previously associated with International Minerals & Chemicals Corp., Chicago; Mathieson Alkali Works Inc., New York; and Grasselli Chemical Co., Boston.



ROBERT B. WITTENBERG
. . . Great Lakes Carbon v. p.

♦ ♦ ♦

Eric O. Prange has been appointed sales representative, Alexander Saunders & Co., New York, to handle the company's precision investment casting equipment and supplies in Ohio, Michigan and Indiana, with headquarters in Detroit.

♦ ♦ ♦

John E. Glennon Jr., formerly assistant plant superintendent, Unitcast Corp., Toledo, O., has been appointed steel foundry superintendent, Omaha Steel Works, Omaha, Nebr.

♦ ♦ ♦

Cline H. Welch, vice president-general manager, Alloy Cast Steel Co., Marion, O., has been elected president, succeeding Robert C. Owens. **Keith A. Welch,** formerly superintendent, has become vice president-works manager, and **Charles G. Carlisle,** treasurer, has been made secretary-treasurer.

♦ ♦ ♦

Burton L. Bevis, who has been elected chairman of the Central Illinois Chapter of the AFS for 1954-55, for the past year has been supervisor of related classroom courses, Caterpillar Tractor Co., Peoria, Ill. Mr. Bevis joined the company in 1936 and after a 4-year apprenticeship became a coreblower operator. From 1941-1943 he was assigned to molding division quality control, foundry laboratory sand control, and molding line foreman. Following two years of Navy service he returned to the company as foundry apprentice course instructor and in 1947 became training supervisor for various apprentice courses. He supplemented his work at Caterpillar by taking part-time courses at Bradley University. Mr. Bevis was vice chairman of Central Illinois Chapter last year.

BURTON L. BEVIS
. . . heads AFS chapter

♦ ♦ ♦

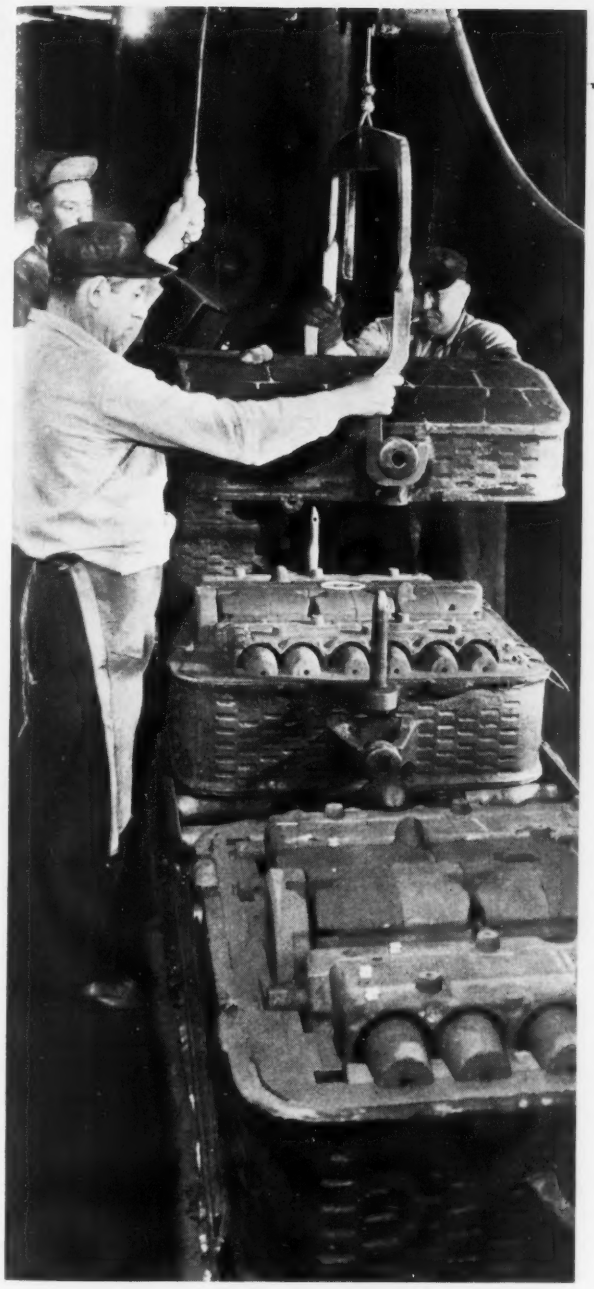
Harold W. Rider has been named sales manager, Commercial Steel Casting Co., Marion, O. Mr. Rider joined the company in 1936 and was in the inspection department until 1945 when he was assigned to sales.

♦ ♦ ♦

M. N. Boyde, until recently publicity manager, Foundry Services Ltd., Birmingham, England, has been appointed sales manager, Polygram Casting Co., Ltd., Chiswick, London, to handle its shell molding machines and equipment.

♦ ♦ ♦

Carl F. Weiblen has been transferred from Blaw-Knox's Pittsburgh home office to Chicago, as sales engineer for its bucket division. He has been associated with the division for 15 years.



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if you are reader of a routed copy of FOUNDRY, we invite you to let us serve you with a personal subscription starting with this issue. FOUNDRY is $5 for one year (12 issues), $8 for two years.

Coming in November . .

A SPECIAL SYMPOSIUM ON

Molding Sand Practice

* THE EDITORS OF *FOUNDRY* announce an important series of articles on molding sand practice to appear (complete) in the forthcoming November issue.

Nine well-qualified foundrymen will discuss molding sand types, how they are prepared and handled, how they are used, defects in castings attributable to sand—and other readable facts on this ever-important aspect of castings production.

THEY'LL BE PRACTICAL ARTICLES—

Much of the information given will be designed for direct application by readers of FOUNDRY to their own shop problems in the use of molding sand.

●

In the November issue of FOUNDRY:

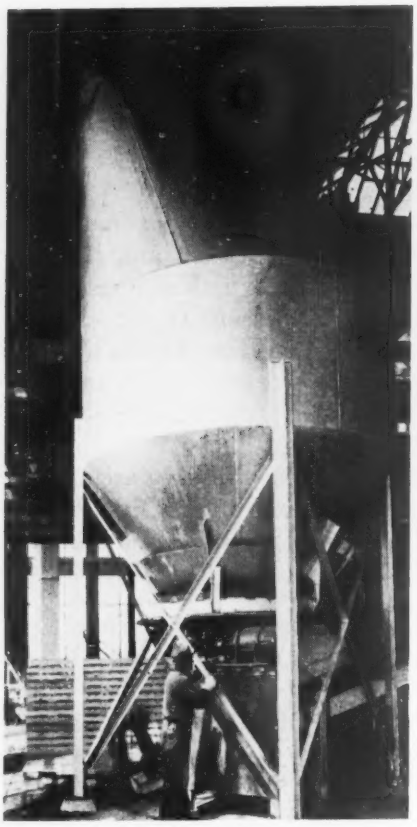
MOLDING SAND PRACTICE
(In 9 parts)

1 **SYNTHETIC Molding Sands**
2 **NATURAL Bonded Molding Sands**
3 **BRASS AND BRONZE Sand Practice**
4 **STEEL Foundry Sand Practice**
5 **MALLEABLE Sand Practice**
6 **GRAY IRON Sand Practice**
7 **MAGNESIUM Foundry Sands**
8 **ALUMINUM Sand Practice**
9 **TESTING Molding Sands**

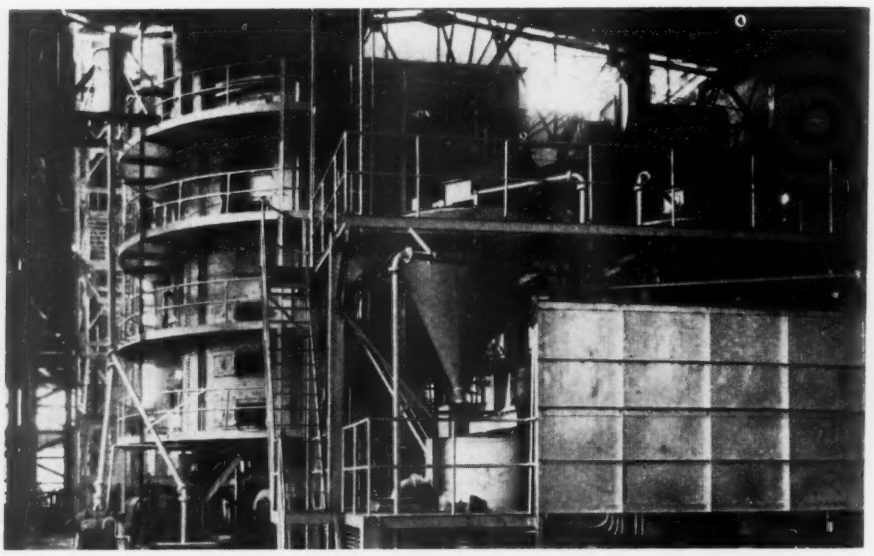
FOUNDRY A Penton Publication, 1213 West 3rd St., Cleveland 13, O.

Open-house tour marked completion of $4-million modernization program

These two workmen were inspecting a cored up mold for a railway truck frame during the recent open house. The cope is about to be lowered into place



Huge surge bin is part of the sand distribution system just installed



One focal point of the new sand reclamation system is the large calcining furnace in the background. A cone-shaped classifier can be seen at right

Canadian Foundry

Completes Modernization Program

ONE of the most comprehensive modernization programs in the steel foundry industry on this continent was completed recently by Canadian Car & Foundry Co. Ltd. at its Longue Pointe plant, Montreal.

Although the bulk of the company's output is for domestic consumption, many of its castings have found their way into virtually every country of the free world. Annual production is approximately 36,000 tons—about 40 per cent of the nation's output—ranging from 4-ounce castings to those weighing 60 tons.

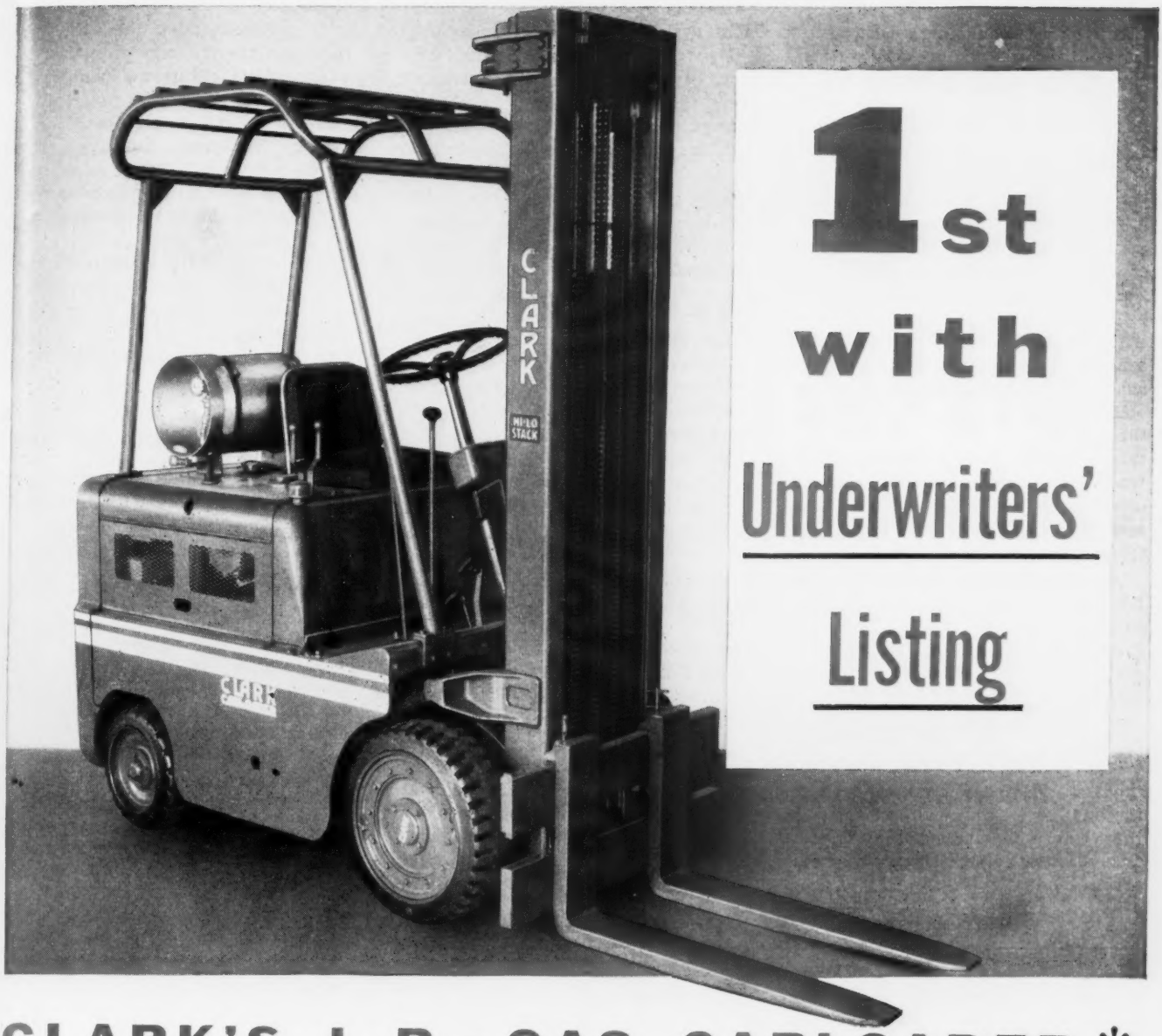
Costing more than $4 million, the modernization program was highlighted by the installation of a new sand handling and sand reclamation system.

New production floor layouts have been engineered for maximum efficiency to tie in with the operation of the automatic sand system. Modern molding equipment has been installed in various departments which produce small to medium size castings. The plant railway track layout has been radically revised to facilitate faster and more efficient servicing of the various areas of production.

To improve working conditions for the foundry's 1300-odd employees, a new dust collection system was installed. Better housekeeping methods have also been implemented by the use of special floor-cleaning equipment.

The new sand system provides facilities for unloading, storing, dis-

(*Concluded on page* 148)



1st with Underwriters' Listing

CLARK'S L.P.-GAS CARLOADER *

reduces engine maintenance, eliminates obnoxious exhaust fumes

1. Greatly reduces engine maintenance:

——eliminates unburned carbon deposits and crankcase dilution.

——eliminates fuel pump and complicated carburetor adjustments.

2. Eliminates obnoxious exhaust fumes:

——L.P.-Gas provides almost perfect combustion, excellent for indoor operations.

3. Provides safe, efficient operation:

——vacuum ignition switch is interlocked with fuel line and manifold, impossible to spill fuel or load-up engine.

——high compression head (8.5 to 1) gives maximum economy and power from high octane L.P. Gas.

——quickly demountable tank takes 3 minutes to change.

——Stellite valves and seats prevent burning from high flame temperature of L.P. Gas.

*4000 lb. capacity, available with standard shift, Hydratork or Dynatork.

Now you can have the advantages of liquified petroleum gas-powered (butane, propane) materials handling, with complete safety. The Clark L.P.G. Carloader is the first lift truck to receive the all-important listing of Underwriters' Laboratories. Field and factory tested for two years, Clark's unit is specifically designed and metered for fork truck operation. For details, call your local Clark dealer, listed under "Trucks, Industrial" in the Yellow Pages.

CLARK EQUIPMENT

Industrial Truck Division
CLARK EQUIPMENT COMPANY
Battle Creek 16, Michigan

☐ Send details on LPG truck

Name_____
Firm_____
Address_____
City_____

(*Concluded from page* 146)

tributing and reclaiming. One of its most important features is in the improved control of sand quality. An economy of space is achieved by storing sand in a battery of five huge silos, each holding 1600 tons. It is the largest installation of silos in the Canadian foundry industry.

Sand handling is completely automatic. Sand flows from the railroad car into a hopper below ground level from where it is fed by conveyor belt into an elevator and lifted to the top of the storage silos. The sand is then directed to the proper silo, according to its specified grade.

Electric vibrating feeders are used throughout the sand distribution system and 4000 feet of belting move the sand through the various stages of foundry use. The system uses metallic oscillating conveyors to transport the sand when it is hot.

A large control panel atop the five storage bins controls sand withdrawal from any one of the silos. Flow of sand to any of the six mullers is also operated by control switch. A signal system on each muller indicates the amount of sand on hand.

Many mold and core production areas are located some distance from the mullers. Movement of sand to these areas is controlled by operators situated at strategic points who are in contact with the supply area by means of a two-way communications system.

The feeder line supplying the large motive sandslinger does not require the services of an attendant. When the operator puts his machine in motion, a surge bin feeds the slinger automatically.

Four new, large shakeouts and several spillouts have been installed, complete with draw-offs to control the dust hazard. The largest shakeout will take 100-ton loads of castings and sand.

Conveyors transporting used sand discharge at a central point where the sand enters a huge rotating core breaker. This unit pulverizes the sand and removes tramp metal.

The new sand reclamation system installed at Longue Pointe solves the problem of sand waste. Used sand is restored to new-sand condition by a process of washing and calcining. More than 75 per cent of the sand previously discarded can now be used interchangeably with new sand.

The plant has more than 600,000 square feet under roof. The facilities include extensive pattern shops, a power plant, casting finishing departments and track work and assembly shops. It is equipped with 35 overhead cranes, ranging in capacity from 3 to 50 tons. There are three 25-ton open-hearth furnaces, two electric furnaces and a reverberatory furnace.

The original plant was built in 1911 when the industry saw the beginning of its greatest expansion in supplying castings for the rolling stock of the Canadian Pacific and Canadian National Railways. The making of steel castings was also stepped up by the rapid development of Canadian industry during the 1910-20 era.

The plant supplies castings for many Canadian and foreign industries, including railroad, hydro, mining, construction, automotive, newsprint, steel manufacturing and others.

CORE MADE WITHOUT BOX: Foundry Division, Chambersburg Engineering Co., Chambersburg, Pa., made this large core without the use of a core-box or arbors. Cement-bonded sand was used to make the core for an iron exhaust casting weighing 48,000 lb. A mold for the outside of the casting was made first. This mold was lined with a layer of sand the exact thickness desired for the casting walls. The core was made within this layer of sand, making an accurate reproduction. It was then removed, the sand lining stripped out of the mold, and, after the mold and core were checked for accuracy, the core was set in the mold, ready for casting

AMA Issues Booklets on Management Topics

American Management Association has issued several booklets in its general management and personnel series. Booklet 156 in the personnel series, entitled "Industry at the Bargaining Table," covers such subjects as guaranteed annual wages, bargaining on labor's demands and fringe benefits, the Taft-Hartley Act and the role of government in labor relations.

Booklets 168, 169, and 170 in the general management series are entitled "The Challenge of a Buyer's Market," "Management at Mid-Century," and "Building a Balanced Communications Program," respectively. Each contains several articles on management problems and their solutions.

Booklets 100 and 101 in the insurance series are entitled "A Critical Look at the Insurance Buyers Role," and "Maintaining a Dynamic Insurance Program," respectively. In the former, four articles discuss objectives of insurance management, selection of an insurance program, how to work effectively with other departments, and the insurance manager's role in loss prevention. The latter contains a discussion determining what and how to insure, policy negotiations and renewal, maintaining a dynamic insurance program and analyzing group insurance costs.

Booklets 104 and 105 in the financial management series are entitled "Modern Management of Capital Expenditures" and "Guides to Modern Financial Planning," respectively. Problems of budgets, salary planning, procurement of capital, tax policies, controls for expenditures, and measuring the investment worth of capital proposals are included in the subject matter.

Copies are available from the association, 330 West 42nd St., New York 36. Price to members is $1 each, to nonmembers, $1.25 each.

CONTROL

RAISES QUALITY... CUTS COSTS

At E • Long Ltd., Orillia, Ontario, a Model "60" Speedmullor mulls 120 tons of synthetic molding sand to exact physical properties each day. Mulltrolmatic precisely controls the 80 second total mulling and cooling cycle.

MULLTROLMATIC CALLS SIGNALS FOR SPEEDMULLOR AT E • LONG LTD.

Control often spells the difference between a profitable and an unprofitable foundry operation. No foundry can afford to disregard the advantages of controlled operations.

1 The product is more uniform . . . high quality may be maintained continuously.

2 Controlled uniformity permits a substantial reduction in material costs.

3 Controls take over and permit essential manpower to be relieved for other jobs.

4 The equipment is operated correctly *all* of the time. Human elements of error are eliminated.

These are but a few of the benefits. Write now for full information to *Beardsley & Piper, Div. Pettibone Mulliken Corp., 2424 N. Cicero Ave., Chicago 39, Illinois.*

LOOK TO
BEARDSLEY & PIPER
FOR BETTER METHODS

FEMA

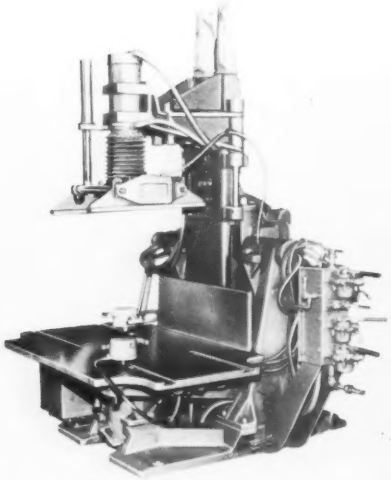
B&P

Babcock-Wilcox of Canada Chose ONE Line of Molding Machines For 90% of their Molding....

The foundry has standardized on 24 x 30 inch flasks for side floor work. For copes—a J&J 68 SP with 25 x 30 inch table and 600 lb. capacity. For drags a J&J 612 RPB with 24 x 30 inch table and 600 lb. capacity.

The industrial stokers and special heating equipment produced by Babcock-Wilcox at their Galt, Ontario, plant require many top quality castings. That's why B-W depend on B&P - J&J molding machines for the major portion of their molding.

These machines have been doing a highly satisfactory job for many years. Newer J&J machines have many added features. The J&J 920 RB, shown below, features an automatic adjustable flask equalizer and an automatic pattern board clamp. Write now for full information to *Beardsley & Piper, Div. Pettibone Mulliken Corp., 2424 N. Cicero Ave., Chicago 39, Illinois.*



Most of the foundry's large work is handled on a J&J 920 RC. Molds weighing up to 2500 lbs. are rammed. Flasks up to 45 x 60 inches are handled.

LOOK TO

BEARDSLEY & PIPER

FOR BETTER METHODS

Tentative Specifications for Automotive Gray Iron Castings

Tentative Specifications for
Automotive Gray Iron Castings

ASTM Designation: A 159—53T

Issued, 1949; Revised, 1953

Scope

1. These specifications cover gray iron castings used in the automotive and allied industries.

Hardness

2. (a) Castings shall conform to the requirements as to hardness prescribed in Table I. By agreement between the manufacturer and the purchaser, hardness may be specified at definite locations on the castings.

(b) Hardness tests shall be made near the fracture on the broken halves of the test bars. Test bars shall receive the same thermal treatment as the castings.

Table I—Physical Requirements of Automotive Gray Iron Castings[a]

Alloy No.[b]	Brinell Hardness Number	Transverse Strength Min. Lb	Deflection Min. in.	Tensile Strength Min. psi
110	187 max.	1800	0.15	20,000
111	170 to 223	2200	0.20	30,000
120	187 to 241	2400	0.24	35,000
121	202 to 255	2600	0.27	40,000
122	217 to 269	2300	0.30	45,000

[a] Properties determined on test bar 1.2-in. in diameter, broke on 18-in. supports.

[b] These numbers are identical with corresponding SAE numbers in the Standard for Automotive Gray Iron Castings of the Society of Automotive Engineers.

Transverse Strength

3. (a) The transverse test shall be made as described in the Standard Specifications for Gray Iron Castings (ASTM Designation: A48).

(b) Values shall conform to the requirements prescribed in Table I. In case the size of the transverse bar is not specified, the 1.2-in. diameter bar shall be used.

Physical Properties and Chemical Composition

4. (a) Castings, except those intended for brake drums and clutch plates shall conform to the requirements as to tensile strength prescribed in Table I.

(b) Brake drums and clutch plates are considered as special cases under these specifications. Materials intended for such services shall conform to the requirements listed in Table II.

(c) Tension test specimens shall be machined from the transverse test bars to the dimensions shown in ASTM Specifications A48. By agreement between the manufacturer and the purchaser, tension test specimens may be taken at specified locations. In such instances, the physical properties as represented by the test bars should be in agreement with the specifications as supplied by the purchaser. The minimum values shall be established by joint agreement. Tension tests taken from castings may not agree with tests taken from test bars.

Table II—Chemical, Physical, and Structural Requirements of Automotive Gray Iron Castings for Brake Drums and Clutch Plates[a]

	Alloy No. 113[b, c]	Alloy No. 114[b, d]
Chemical Composition		
Total Carbon, per cent	3.40 min.	3.40 min. (mandatory)
Typical Compositional Ranges		
Silicon, per cent	1.10 to 1.70	1.10 to 1.70
Manganese, per cent	0.60 to 0.90	0.60 to 0.90
Sulphur, max. per cent	0.14	0.14
Phosphorus, max. per cent	0.20	0.20
Alloys	As required	As required
Physical Properties		
Brinell Hardness Number	179 to 229	207 to 269
Transverse Strength, min. lb	2200	2600
Deflection, min. in.	0.20	0.27
Tensile Strength, min. psi	30,000	40,000
Structural Properties		
Graphite[e]	Type A, Sizes 2 to 4	Type A, sizes 3 to 5
Matrix	Lamellar pearlite with ferrite if present not to exceed approximately 15 per cent	Fine lamellar pearlite with excess constituent, free cementite or free ferrite or both not to exceed approximately 3 per cent

[a] Properties determined on test bar 1.2-in. in diameter, broken on 18-in. supports.

[b] These numbers are identical with corresponding SAE numbers in the Standard for Automotive Gray Iron Castings of the Society of Automotive Engineers.

[c] Brake drums and clutch plates for moderate service requirements where high-carbon iron is desired and heat checking is a problem.

[d] Heavy duty drums and clutch plates where both heat checking and strength are definite requirements. Since the same base iron is indicated for both No. 113 and 114 it is presumed that alloys will be used especially in the latter to meet the strength and structural requirements.

[e] The type and size of graphite referred to in this table is in accordance with the Recommended Practice for Evaluating the Microstructure of Graphite in Gray Iron (ASTM Designation A 247).

Workmanship and Finish

5. Castings shall represent good foundry practice, shall be smooth and clean, and shall be free from injurious flaws and defects. In other respects the castings shall conform to special requirements agreed upon by the manufacturer and the purchaser.

Machinability

6. Castings shall machine satisfactorily.

Inspection

7. The inspector representing the purchaser shall have free entry, at all times while work on the contract of the purchaser is being performed, to all parts of the manufacturer's works which concern the manufacture of the material ordered. The manufacturer shall afford the inspector, without charge, all reasonable facilities to satisfy him that the material is being furnished in accordance with these specifications.

Rejection

8. All castings which fail to conform to any of the provisions of these specifications shall be subject to rejection. Castings which show injurious defects subsequent to their acceptance at the manufacturer's works will be rejected and the manufacturer shall be notified promptly.

Table III—Typical Base Compositions of Automotive Gray Iron Castings[a]

Alloy No.[b]	Total Carbon Per cent	Silicon Per cent	Manganese Per cent	Sulphur Per cent	Phosphorus Per cent
110	{ 3.40 { 3.70	2.80 2.30	0.50 to 0.80 0.50 to 0.80	0.15	0.25
111	{ 3.25 { 3.50	2.30 2.00	0.60 to 0.90 0.60 to 0.90	0.15	0.20
120	{ 3.20 { 3.40	2.20 1.90	0.60 to 0.90 0.60 to 0.90	0.15	0.15
121	{ 3.10 { 3.30	2.10 1.80	0.60 to 0.90 0.60 to 0.90	0.15	0.12
122	{ 3.00 { 3.20	2.10 1.80	0.70 to 1.00 0.70 to 1.00	0.15	0.10

[a] These suggestions are offered so that the manufacturer will guard against either a low value or a high value for both carbon and silicon. If either one is on the high side, the other should be low.

[b] These numbers are identical with corresponding SAE numbers in the Standard for Automotive Gray Iron Castings of the Society of Automotive Engineers.

Appendix

A1. That data in this appendix are furnished as information only and do not constitute a part of these specifications.

A2. Chemical Composition—The typical base compositions shown in Table III are furnished as information only and are not to be construed as required or sufficient. In some cases, it may be desirable to use alloying elements to obtain the specific service requirements demanded. The kind and amount of alloying constituents used should be a matter of agreement between the manufacturer and the purchaser.

A3. Alloying Elements—When alloying elements are specified, Table IV shows the practical range for commercial limits.

A4. Suggested Uses—Suggested uses for the several automotive gray iron castings prescribed in these specifications may be classified as follows:

No. 110—Miscellaneous soft iron castings in which strength is not of primary consideration. (Either as cast or annealed.)

Table IV—Residual and Alloy Ranges[a]

Elements	Permissible Residuals in Base Iron, Per Cent	Recommended Ranges (For Specification Purposes) from Mean Specified Alloy Content, plus or minus per cent
Nickel	0 to 0.20	0.15
Molybdenum	0 to 0.08	0.075
Chromium	0 to 0.10	0.10
Copper	0 to 0.20	0.10
Vanadium	0 to 0.03	0.03

[a] By agreement between the manufacturer and the purchaser, closer or wider limits than shown in this table may be acceptable.

No. 111—Small cylinder blocks, cylinder heads, air-cooled cylinders, pistons, oil pump bodies, transmission bases, gear boxes, clutch housings, etc.

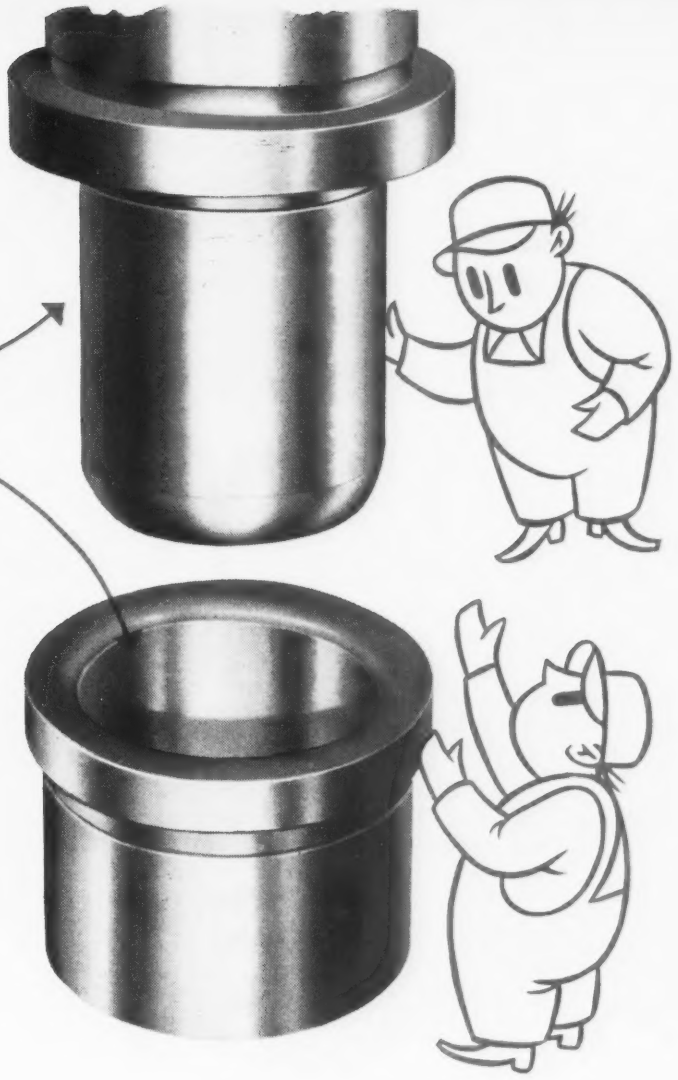
No. 120—Automobile cylinder blocks, cylinder heads, flywheels, cylinder sleeves, cylinder liners, pistons, etc.

No. 121—Truck and tractor cylinder blocks and heads, heavy flywheels, tractor transmission cases, differential carrier castings, heavy gear boxes.

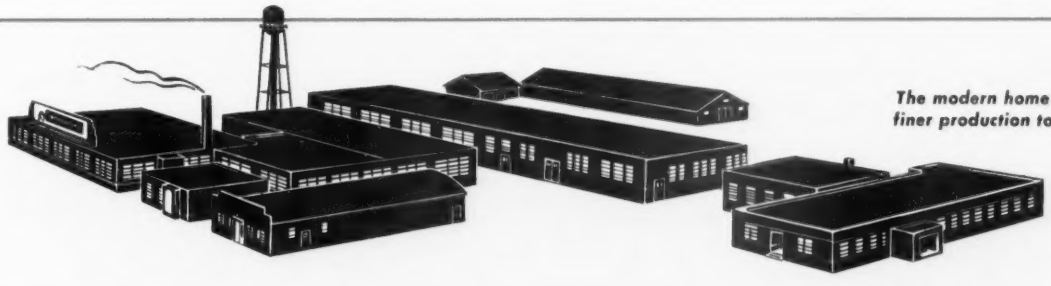
No. 122—Diesel engine castings, liners, cylinders, pistons, and heavy parts in general.

Additional copies of this specification may be obtained from the American Society for Testing Materials, 1916 Race St., Philadelphia 3, for a nominal sum.

carburized and hardened steel wearing surfaces and ductile cores mean long life for UNIVERSAL flask pins and bushings



It's no easy trick to produce flask pins and bushings that are hard enough to take long, rigorous wear, and yet have cores ductile enough to resist breakage and rough treatment in the foundry. However, Universal has accomplished this difficult task. Universal flask bushings are double quenched and double drawn to produce a fine grain structure that will withstand considerable stress and strain without breaking or chipping. The wearing surfaces are carburized and hardened to reduce wear and prolong the life of both pin and bushing. Universal flask pins and bushings are precision ground to extremely close tolerances to insure instant, accurate alignment of cope and drag. Plain, taper and threaded series pins and bushings are available in a complete range of sizes as regular stock items. For complete information about Universal flask pins and bushings, write to the office nearest you — Universal Engineering Sales Co., 1060 Broad St., Newark 2, N. J.; 5035 Sixth Ave., Kenosha, Wis. — or the home office.



The modern home of finer production tools

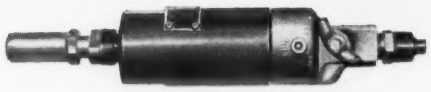
172

UNIVERSAL ENGINEERING COMPANY FRANKENMUTH 4, MICHIGAN

Here is a new line of

CLECO HEAVY DUTY 2 INCH AND 3 INCH GRINDERS

No. 14 Series



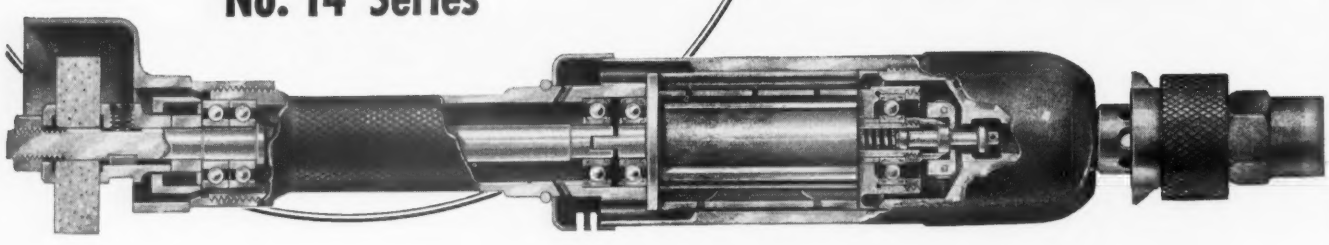
14G-90 GRINDER

14GQ-180 GRINDER

14GEQ-170 GRINDER

14GEQ-140 GRINDER

14GEL-140 GRINDER



Featuring a new, more powerful motor, this line of tools is excellent for heavy duty grinding on small castings and many other foundry finishing jobs. They may be used with cup wheels for close-quarter grinding.

They are fast, rugged and maintenance-free. Write us for a demonstration.

SPECIFICATIONS

Length	8 to 14½ inches, depending on style
Weight	2¾ to 4¼ lbs.
Free motor speed	9,000 to 17,000 rpm
Size wheel, max.	2 to 3 inches, depending on free motor speed
Type of throttle	Thumb, lever or Quick-As-Wink optional

CLECO AIR TOOLS

CLECO

DALLETT

Division of REED ROLLER BIT COMPANY

5125 Clinton Drive — Houston 20, Texas

AIR TOOLS AND ACCESSORIES

Grinders • Sanders • Rotary Drills • Riveters • Backfill Tampers
Chippers • Scaling Tools • Nut Runners • Impact Wrenches
Screwdrivers • Sump Pumps • Paving Breakers • Spike Drivers
Air Line Accessories and Fittings

5063-A

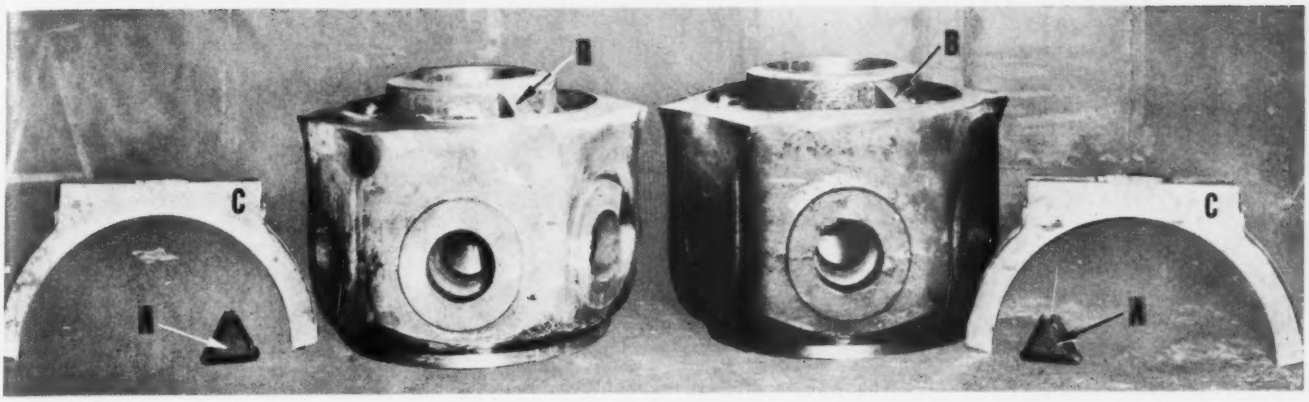


Fig. 1 (above)—A 3-ton compressor cylinder is produced by welding together the two cast halves shown here (B). Parts A and C are required to complete the outer jacket

How To Make a Casting When You Can't Get the Core Out

DESIGNS for a large compressor called for 6-ton, double-walled cylinders with suction and exhaust chambers included in the jacket space. Casting seemed to be the only logical method of producing the part; yet it would have been practically impossible to cast the cylinder in a single piece.

A change in procedure simplified the production of these units at the Cooper-Bessemer Corp., Grove City, Pa. The problem was solved by casting the double-walled cylinder in two parts and joining the halves together by welding. A number of these giant units are being built for use on cross-country gas transmission line pumping stations. Production is now a straightforward job of aligning the castings and applying multipass Unionmelt welding techniques.

The inner cylinder has an inside diameter of 16 in. with 2½-in. thick walls. The outer shell is roughly hexagonal with a wall about 3-in. thick at the center of each face and an inside diameter of approximately 42-inches.

First step in fabricating the cylinder is to machine the mating faces of the two castings. The six parts of the assembly are shown in Fig. 1. Next, the cylinder halves are put into a turning fixture and carefully aligned. Manual arc welds tack the two halves in position and keep the alignment for welding with the Unionmelt "DS" welding head. The cylinder is preheated to about 450°F by burning gas inside. About 30 passes are required to fill up the inner weld.

Besides several webs between the inner and outer cylinders, there are two partitions, "B," that run the entire length of the jacket space and divide it into two compartments—the suction chamber and the exhaust chamber. Before the castings "C" are set in place, these partitions must be completed and capable of standing the operating pressure of

(*Concluded on page* 158)

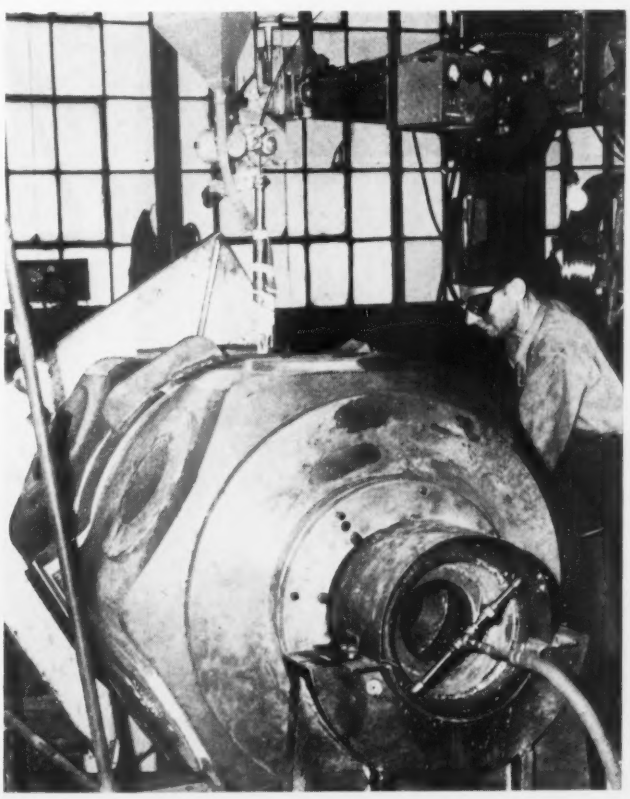
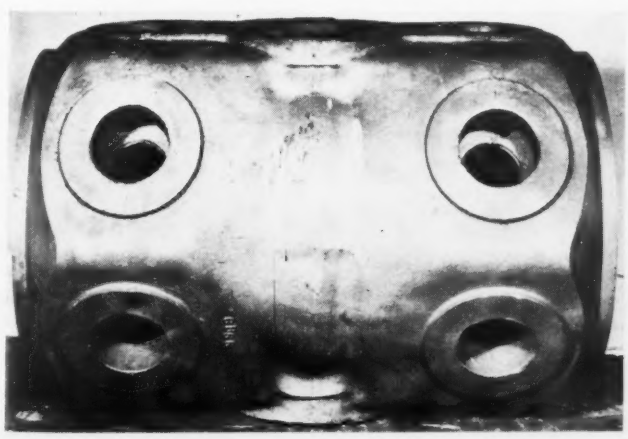


Fig. 2 (right)—Joining halves of the inner cylinder and outer jacket required 55 welding passes

Fig. 3 (below)—Following the welding operation, the cylinders are ground, checked, and annealed



Another HERMAN

Here is one unit in the complete line of HERMAN Molding Machines, in all types and sizes, to fit all foundry operations.

Here i the
heav duty

HERMAN MOLDING MACHINES MAK THEIR

Nat work

THE 6000 lb. Herman Jolt Rollover Machine illustrated is typical of our heavy duty line ranging in rollover capacities from 3000 lbs. to 10,000 lbs.

Chief feature of these machines to bear in mind is that they are controlled by an air-on-oil principle, which absolutely eliminates any jerkiness in their operation.

Smoothness of *both* pattern draw and rollover action is assured because of this hydraulic control principle. These machines bleed to a stop smoothly and easily in a cushioned type action.

In addition, of course, like all HERMANS, the heavy duty machines are ruggedly built to take a wide variety of punishment in your foundry. They are simple to operate, one valve controlling all operations. No power is required for the rollback operation, and they have extremely long pattern draw distance.

Write us for more information today . . . there is a type and size HERMAN Molding Machine for all foundry operation.

i the HERMAN cushioned-action
ıv duty Jolt Rollover Machine

KE THEIR WAY BY THE WAY THEY'RE MADE

FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION MEMBER FEMA

Herman MOLDING MACHINES

HERMAN PNEUMATIC MACHINE CO., UNION BANK BUILDING, PITTSBURGH 22, PA.

Mr. Walsh says:

"Here at Scullin Steel Company we have concluded that the Herman 10,000 lb. Series Jolt Rollover and Draw Machines fit our molding problems to a T.

Our new people find them simple to operate with the single valve which controls all operations. More experienced men like the hydraulic air-on-oil control principle which completely eliminates any jerkiness of operation.

The Hermans bleed to a stop smoothly and easily in a cushioned type action.

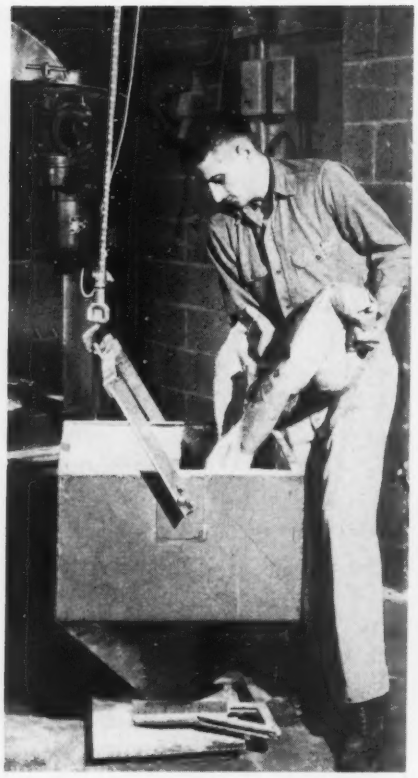
We need machines which can take a lot of punishment. The Herman 10,000# Series units are built to last and have proven themselves over the years as real work-horses.

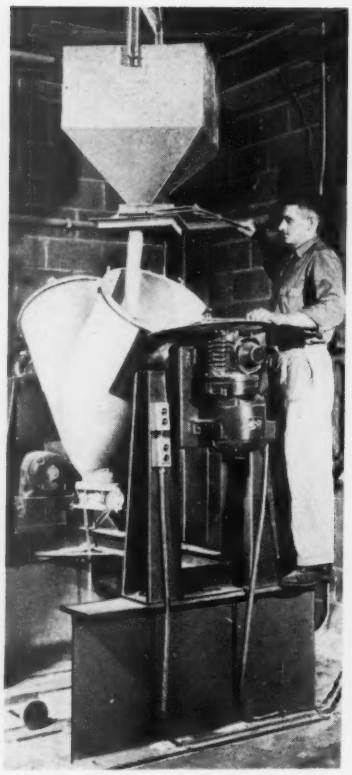
Herman Molding Machines have a very long pattern draw distance and no power is required on the rollback operation."

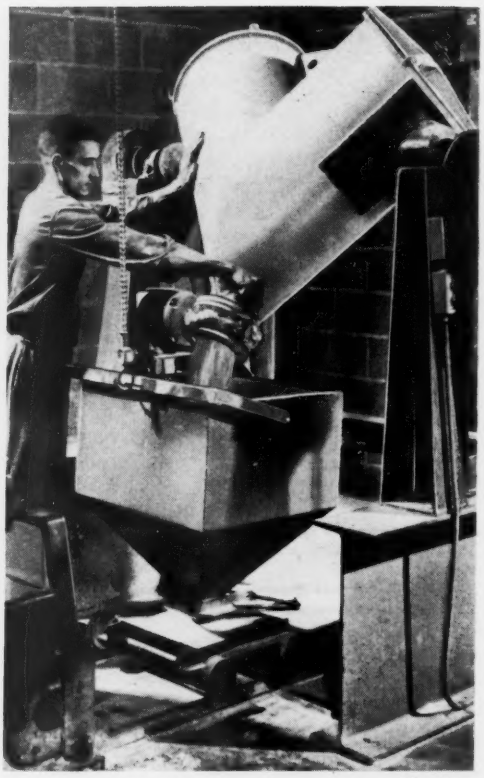
Works Manager
Scullin Steel Company
St. Louis, Missouri

Herman MOLDING MACHINES

HERMAN PNEUMATIC MACHINE CO., UNION BANK BUILDING, PITTSBURGH 22, PA.







Illustrations show the sequence of sand-resin mixing operation

UP photos

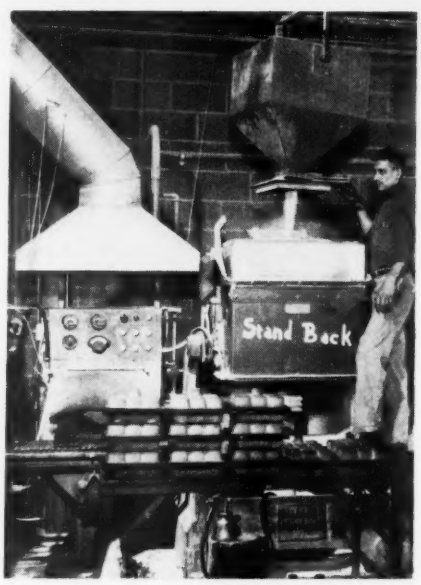
SAND MIXING SIMPLIFIED

In Shell Mold Foundry

AN EFFICIENT arrangement permits a shell molding machine operator at the Midwest Foundry Co., Coldwater, Mich., also to prepare the sand-resin mixture and load the machine. The mixture is prepared in a Patterson-Kelley twin shell blender located a few feet from the molding machine. A special hopper developed by Midwest is used to load the blender and the machine. This hopper is handled by an electric hoist running on an overhead monorail and is equipped with a hand-operated slide valve opening in its tapered bottom.

The hopper is loaded with a 425-lb batch of sand and resin. It then is elevated over the blender, the contents dumped and the hopper is lowered and positioned before the blender's discharge opening. After a six-minute mixing period the mixture is returned to the hopper and the latter is elevated over the molding machine for discharge.

The twinshell blender is capable of thoroughly mixing up to 2500 pounds of sand and phenolic resin an hour. This is more than sufficient to meet the requirements of two molding machines.



(*Concluded from page* 155)

the pump.

The two triangle pieces, marked "A" in the photograph, are welded to the partitions marked "B" by manual arc. Two strips of ¼ x 1-in. steel are welded to the inner edges of the outer shell to back up the welds. Now the two semi-circular castings "C" are placed in position and joined to each other by "strong backs." The two girth joints are then filled completely by Unionmelt welding in 55 passes as shown in Fig. 2. After the two girth welds are made, the "strong backs" are removed and the two joints in the band filled in with manual arc.

After welding, the cylinder is ground, tested for surface cracks and then annealed. The completed cylinder is shown in Fig. 3. Welding is done with a current of 575 amp dc, reverse polarity supplied by a rectifier unit. Oxweld No. 36 high-tensile steel rod is used with Unionmelt grade No. 90 welding composition. Overall time for fabrication of the cylinder was 16 hours, of which about 10 hours was actual welding time. This job was almost impossible by manual welding methods.

Microscopy Volume Ready

A series of lectures delivered in 1953 at the Institution of Metallurgist's refresher course has been compiled in one volume. Subjects covered are microscopes and their use, general metallography, use of polarized light in metallography, hot stage microscopy, and phase-contrast and interference metallography.

Copies of the volume, ***The Microscopy of Metals,*** are obtainable from the Registrar-Secretary, Institution of Metallurgists, 28 Victoria St., London, S. W. 1. Cost is 15s 6d.

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FOUNDRY DEVELOPMENTS

By EDWIN BREMER

Metallurgical Editor

EPOXY resin, reinforced with fiber-glass cloth, small angle irons and rods, is being used to make core drier fitting slugs. The slugs are made in a manner similar to that for plaster slugs, but it is said that they will outlast either plaster or metal. Additional applications in patternmaking await further study and research.

* * *

PINHOLE porosity in brass and gun metal castings was found to be due to use of flour additions either as a dusting or in the molding sand, according to an investigation by N. B. Rutherford. Data were presented in a paper at the recent annual meeting of the Institute of British Foundrymen. Castings involved were faucets and other plumbing goods which had to be plated. Use of ½-per cent of pelleted pitch in the facing instead of the flour gave a good surface on the castings with ease of stripping. Protection and satisfactory surface also were obtained with sodium silicate-water and synthetic resin-water mold dressings.

* * *

EFFECT of the Martin hard coat process on two cast and five wrought aluminum alloys is described in "Study of Hard Coating for Aluminum Alloys" recently issued by the Office of Technical Services, Washington 25. Wear resistance is reported far above standard anodizing treatments and is equal to or better than thin cyanide coatings on steel. However, decreases of up to 65 per cent in fatigue strength of base metal indicate that hard coating is not suitable in applications subject to cyclic stresses. Hard coating also increases resistance to corrosion. Report is PB 111320, and is available for $2.

* * *

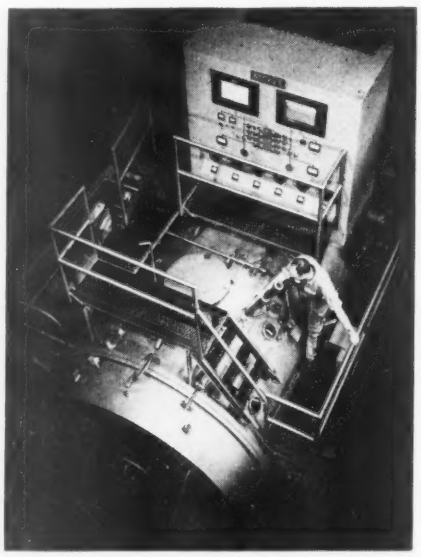
ONE foundry making thin gray iron castings is obtaining excellent results in finish by employing a graphitic additive in the molding sand. Results also indicate that the iron flows better or has greater fluidity than was the case when the material was not used.

* * *

ARTICLE on "Staining of Clad Aluminum Alloy Sheets During Salt-bath Heat-treatment" by E. C. Williams and H. J. G. Challis in the June issue of the *Journal* of the Intitute of Metals (London), indicates that staining results when the free alkali content increases to more than 0.03 per cent expressed as Na_2O. Trouble may be eliminated by treating the bath with gaseous CO_2 until the free alkali is reduced below the indicated figure. Treatment may be used in molten salt baths containing added nitrite.

* * *

ALLOYS for jet engines will be melted and cast in the new vacuum furnace shown here. It was recently installed at Utica Drop Forge & Tool Corp., Utica, N. Y. The 1000-lb capacity furnace is the largest ever constructed for melting and centrifugally casting high-temperature alloys. Utica's new furnace,



designed and built by F. J. Stokes Machine Co., Philadelphia, is designed to carry out all the heating, melting, alloying and casting operations within the vacuum chamber. High-purity-alloys of superior heat-resisting properties for use in turbine blades and disks of advanced jet engines will be made in the new furnace. By melting and casting these high-temperature alloys under high vacuum, critically-scarce and expensive alloying elements like titanium and molybdenum will be conserved and more economically used because their hardening qualities are fully effective in smaller quantities than normally required.

* * *

A PAPER describing some phases of the production of extremely heavy steel castings indicates difficulty encountered in raising them out of the floor pit in which they are made. Presented at the annual meeting of the Institute of British Foundrymen and entitled "Production of Heavy Steel Castings" by S. Taylor, the paper states the castings weighing 185 tons finished required 237 tons of steel to pour. Castings cooled three weeks in the pit and were roughly cleared of sand on the sides and ends. Then heavy steel girders placed across the pit and supported on hydraulic jacks were used to start the casting from its bed. Jacks registered a load of 700 tons in the starting movement.

* * *

PROPER care of the crucible in melting aluminum alloys can greatly prolong its life and effect substantial savings in time, money and labor, according to Electro Refractories & Abrasives Corp., Buffalo. In a recent release with reference to silicon-carbide type crucibles the firm makes these suggestions: Scrape the crucible thoroughly after every heat while hot to remove dross. At the end of the day, empty it completely and scrape clean. Where possible avoid leaving even a small frozen metal heel in the crucible before heating since the metal expands more than the crucible and may split it. Adding a large amount of cold ingot to a relatively small amount of molten metal may solidify the latter and cause breakage. Packing ingots against the crucible walls also may cause breakage. Dropping an ingot into the bottom of the crucible is quite likely to break it. Finally it is pointed out that crucibles are made strong and tough enough to melt and hold metal, but they will not stand too much abuse.

* * *

MEDIUM expansion plaster or gypsum, which expands from $\frac{1}{16}$ to about $\frac{3}{32}$-in. per ft depending upon the amount of water added, can be used for a number of purposes, according to a paper presented by O. H. Harer at the annual convention of the American Foundrymen's Society. Entitled "Practical Applications for Expansion Plaster," it lists the following: 1. When only a single shrink pattern is available, a matchplate can be made for production purposes directly from that pattern by using expansion plaster. 2. Replacement of a corebox can be accomplished by taking a slug from the corebox and expanding to compensate for correct shrinkage. 3. Wood or plaster models made to standard dimensions can be expanded and metal equipment produced to take care of production requirements.

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Chicago To Be Site of National Metal Show

For the ninth time since 1919 Chicago will be the site, Nov. 1-5, of the 36th annual National Metal Congress and Exposition, sponsored by the American Society of Metals. The congress will be held in the headquarter hotels of the participating societies and the exposition will be held in the International Amphitheater.

According to W. H. Eisenman, managing director of the event, 444 firms will occupy 263,000 sq ft of floor space to show new products, new processes, new developments, and new services being offered to American industry by leaders in the metalworking field. A diversity of interests will be on display and in operation at the exhibitor booths.

Three technical societies directly concerned with the advancement of science and engineering in the metals industry are participating in the congress with the ASM. They are the American Welding Society, Society for Non-Destructive Testing, and the Institute of Metals Division, American Institute of Mining and Metallurgical Engineers.

The ASM will headquarter at the Palmer House, the AWS at Hotel Sherman, and the Institute of Metals Division, AIME, and the Society for Non-Destructive Testing will be at Hotel Morrison. All four groups will hold technical sessions, business meetings, banquets, and exhibits at their respective hotels during the Congress.

Survey Reveals Shortage of Metallurgy Students

Results of a survey of metallurgical studies in engineering schools just conducted by the American Society for Metals explains the principal reason for a shortage of metallurgical engineers and points up an obligation on the part of both higher educational institutions and industry to emphasize broader understanding of the role of metallurgical engineers.

The survey indicates that about 2300 students in engineering schools aspire to a bachelor's degree in metallurgical engineering and that probably less than 10 per cent of them will graduate in 1954. Career changes and other deviations may well reduce the total by another 20 per cent, yet the present shortage of metallurgical engineers is estimated at more than 2000. American industry is calculated to need more such engineers now than will be graduated during the next five years.

A separate survey conducted by ASM revealed that 747 students are enrolled currently in 47 engineering schools which offer postgraduate courses in metallurgy.

AMA Issues Booklets in Management Series

American Management Association has published two booklets in its management series. Booklet 214, "Adjusting to a Competitive Economy—The Human Problem," contains two articles on human relations in a "hard-sell" period and tightening work standards and strengthening incentives. Also included is a panel discussion on the increasing responsibility of the manufacturing executive. Booklet 215, "Strategic Areas in Cost Reduction," presents four papers covering various aspects of purchasing, materials handling, preventive maintenance, and cost cutting controls.

Copies are available from the association, 330 West 42nd St., New York 36. Price is $1 to members, $1.25 to nonmembers.

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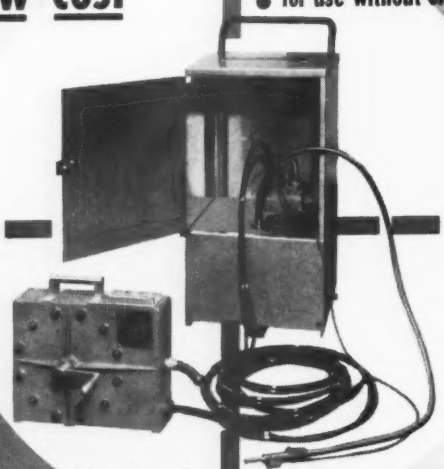

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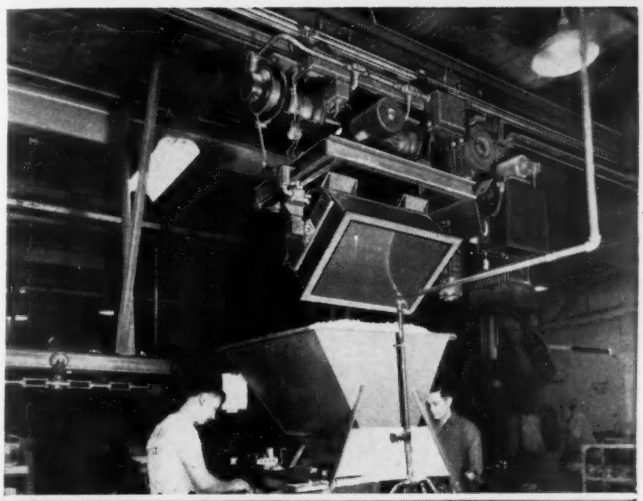

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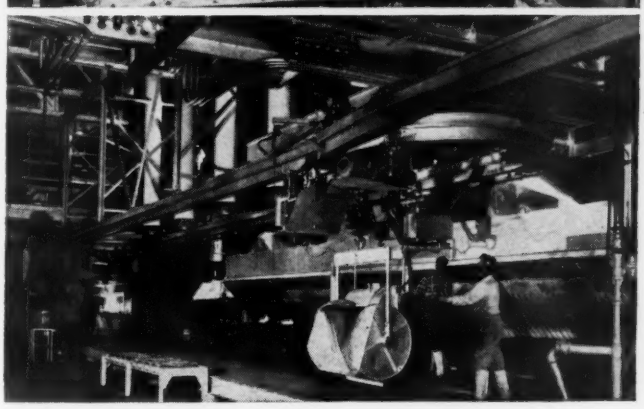

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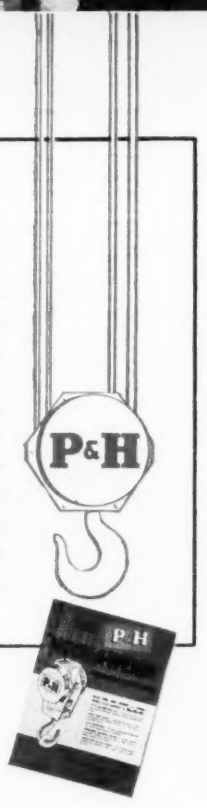

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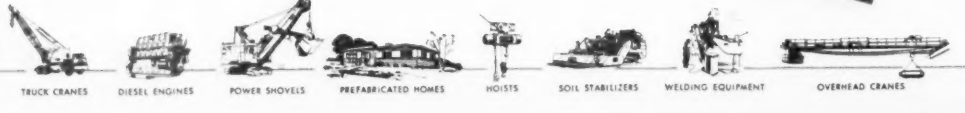

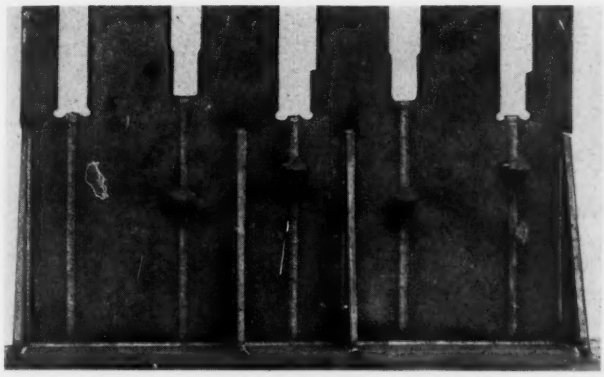

Fig. 1—Edges of cast parts of the fabricated roll housing first were beveled, then welded together

Fig. 2—Section of side frame of the base shows the cast parts which were welded into the assembly

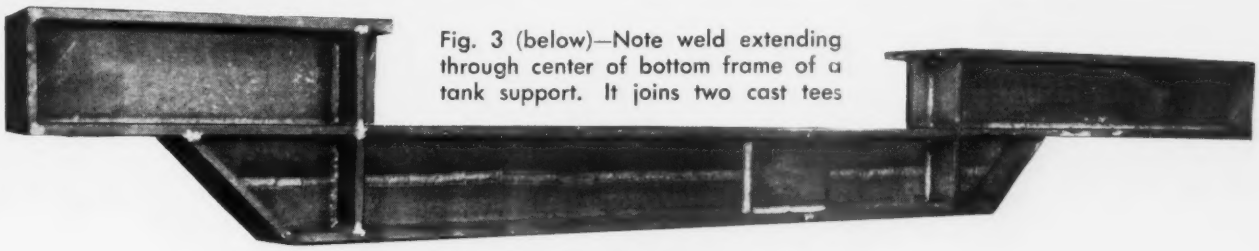

Fig. 3 (below)—Note weld extending through center of bottom frame of a tank support. It joins two cast tees

Welding Copper and Copper Alloy Castings

By A. O. DODGE
Supervisor, Technical Sales
Air Reduction Sales Co.
New York

THE advantages of combining the techniques of casting and welding have been known to foundries for some time. Experience has shown that welding parts from cast components results in stronger, cheaper and better designed products.

Rather than depriving foundries of business, as was one time feared, welding has brought new business and, if anything, broadened the scope of operations. By welding castings, it is possible to produce parts of such size and/or complexity that they would be difficult or impossible to produce as single castings, and expensive to fabricate as weldments.

Until recently, the technique has been restricted largely to the manufacture of parts made from steel or other easily welded metals. The difficulties encountered in welding castings made from such metals as aluminum bronze and copper did not make cast-welding feasible except in a few isolated cases.

Typical of the problems encountered were those confronting the Wheeling Bronze Casting Co., Wheeling, W. Va., when it undertook the fabrication of a large aluminum bronze base for an electrolytic plating line in a steel mill. The base was too large to be cast as a unit with the company's facilities, but it could be cast in sections which would be welded together afterwards.

The welding of aluminum bronze is generally regarded as difficult, largely because of a highly refractory oxide coating on the metal surface. Before good fusion and sound welds can be made, this coating must be broken up and prevented from developing further during welding. Another complication arises from the distortion of the metal due to heat variations resulting from welding.

Fig. 4—Aluminum bronze floor grating to which the cross strips are being welded is a one-piece casting

Castings themselves present problems because of their relatively broad dimensional tolerances. Variations result in poor fit-ups, especially with large castings, and require the use of filler metal for the production of sound welds.

The development of inert-gas-shielded arc welding processes in which a consumable electrode is utilized has provided answers to these problems, in general, and has helped to broaden considerably the applications of welded castings.

The Aircomatic process of Air Reduction Co. Inc., New York, is an example. It provides a number of advantages that fit it particularly well for welding parts such as the base described above. The process utilizes a curtain of inert gas to cover the arc and the weld area and to prevent oxidation of the weld area during welding. This curtain is particularly helpful when a metal like aluminum bronze is welded. A wire run through the manual holder, or "gun," acts as the electrode. This wire is mounted on a reel and is fed at a controlled rate to produce a good, sound weld.

The high current densities characteristic of the process are an aid in welding metals with a high affinity for oxygen. Once oxide coatings have been thoroughly removed by sanding or wire brushing, they

(Continued on page 168)

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(*Continued from page* 165)

do not reform sufficiently during welding to hamper welding progress. As a result, the weld is characterized by excellent fusion and is uncontaminated by oxide inclusions. The limited area to which the arc heat is restricted is advantageous, particularly in the case of thin-walled castings, because distortion of the part due to heat variation is minimized.

The process is well adapted to joining castings with poor fitup because the consumable electrode supplies the filler metal for the gaps. This filling can be done at a remarkably high rate of speed when necessary, and the economies represented in time saved alone are considerable.

The features of this method appeared to provide the answer to the problem facing Wheeling Bronze.

Figs. 1 through 3 show various sections of the base as they appeared partially assembled. Fig. 1 shows a section of the fabricated roll housing. Here, the edges of the cast parts were beveled first, then welded together. The base plate is 2 in. thick.

Fig. 2 is a section of side frame showing the cast parts welded into the assembly.

Fig. 3 shows a tank support. Note the weld down through the center of the bottom frame which joins two cast "tees." The raised sections at the ends were individually cast and welded to the bottom frame.

The uniform, neat appearance and the cleanliness of the welds, as shown in these illustrations, are reliable indications of the high quality obtained. No time was required after welding for dressing up the weld surfaces. Inert gas shielding eliminates the inconvenience of slag and oxides which would require cleaning if other welding processes were used.

Welding this base required the use of aluminum bronze filler metal in the form of 1/16-in. No. 100 welding wire. Approximately 1200 lb of the entire assembly weight of 145,640 lb was filler wire. It was fed at a speed of about 200 in. per minute. A flow of 50 cu ft per hour of argon was used, with a welding current of 240 amp reversed polarity, direct current.

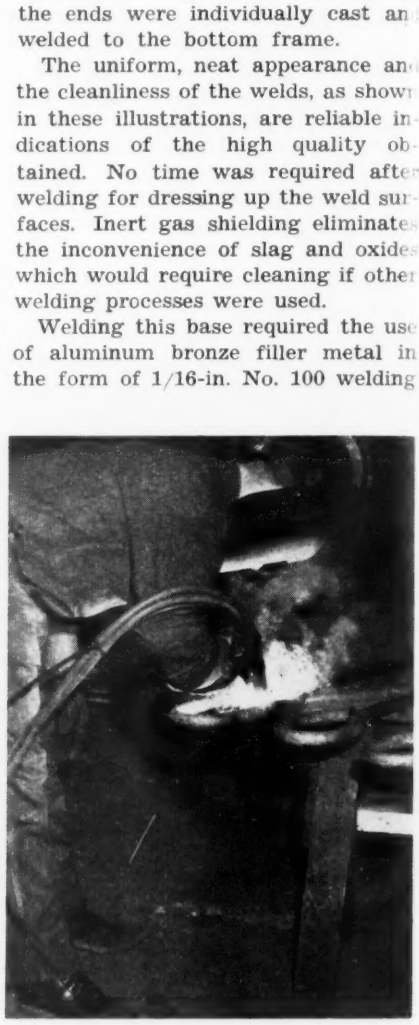

Fig. 5—Aluminum bronze "eye" bars are welded in 5-6 minutes

Wheeling Bronze never before had attempted a job of this size. With inert-gas-shielded arc welding using a consumable electrode they were able, however, to complete it successfully and profitably. Also, once the equipment was made available and proven economically sound, many other applications were evident.

The aluminum bronze floor grating shown having cross strips welded to it in Fig. 4 is a one-piece casting. As cast, the bars are subject to breakage and bending out of alignment. The cross strips provide neces-

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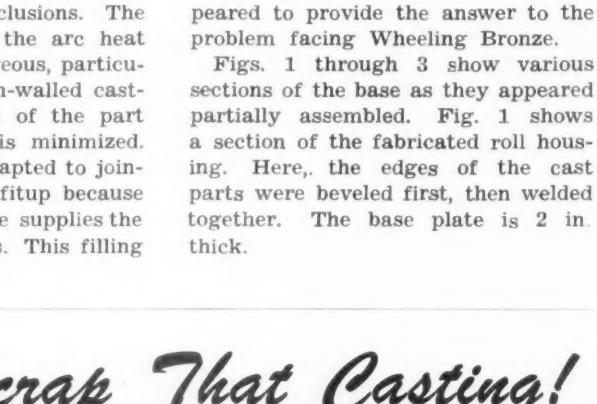

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sary strength and stability and are much easier to weld into place than to incorporate in an integral casting.

Another instance in which casting and inert-gas-shielded arc welding were combined to make an aluminum bronze product both better and more economical is shown in Fig. 5. Here, 1-in. diameter aluminum bronze "eye" bars have been formed and are being welded. A direct, reversed polarity current of 225 amp is being used with 1/16-in. aluminum bronze welding wire. The filler wire is feeding at a speed of 140 in. per minute, and the entire weld area is shielded by a flow of 50 cu ft per hour of argon. Before this welding process was used, the "eye" bars were preheated and welded with stick electrodes, the operation requiring a welding time of 15 to 20 minutes on an end. Little wonder the inert-gas-shielded arc welding process, producing finished welds in five to six minutes, replaced the earlier method.

The story is not limited to the experience of this company alone. There is the instance of another foundry engaged primarily in the casting of copper tuyeres and cooling blocks for use in blast furnaces. These are relatively complex castings which, when first cast, may contain a number of defects. Besides making new castings, this foundry receives a certain number of used ones each month to be repaired. Previously, this particular company had simply been scrapping all damaged castings and replacing them with new ones. It was found, upon careful analysis of the costs, that by using an inert-gas-shielded arc welding process with a consumable electrode to make repairs, the costs of repairing the parts could be reduced.

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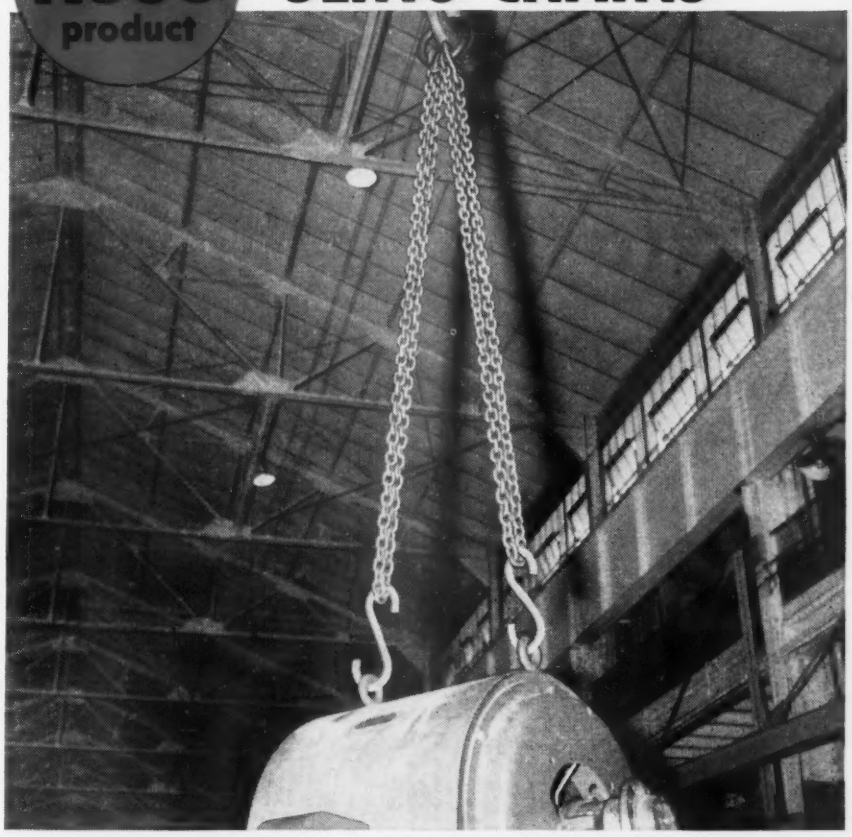

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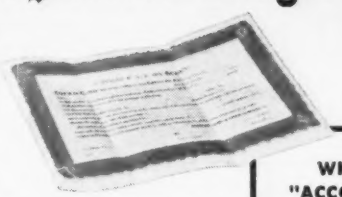


• This 125,000 psi ACCO *Registered* alloy sling chain has great strength, yet it's lightweight and easy for men to handle. It will lift a variety of expensive loads safely over costly machines. You can be sure of that because it's ACCO *Registered.*

ACCO *Registered* is more than a name. It's more than a registered trade mark of American Chain & Cable. It is the standard by which all other slings are judged. It means that you can equip your shop with dependable "lifting tools" specifically designed for highest efficiency and long life by trained engineers who spend all their time designing and testing slings.

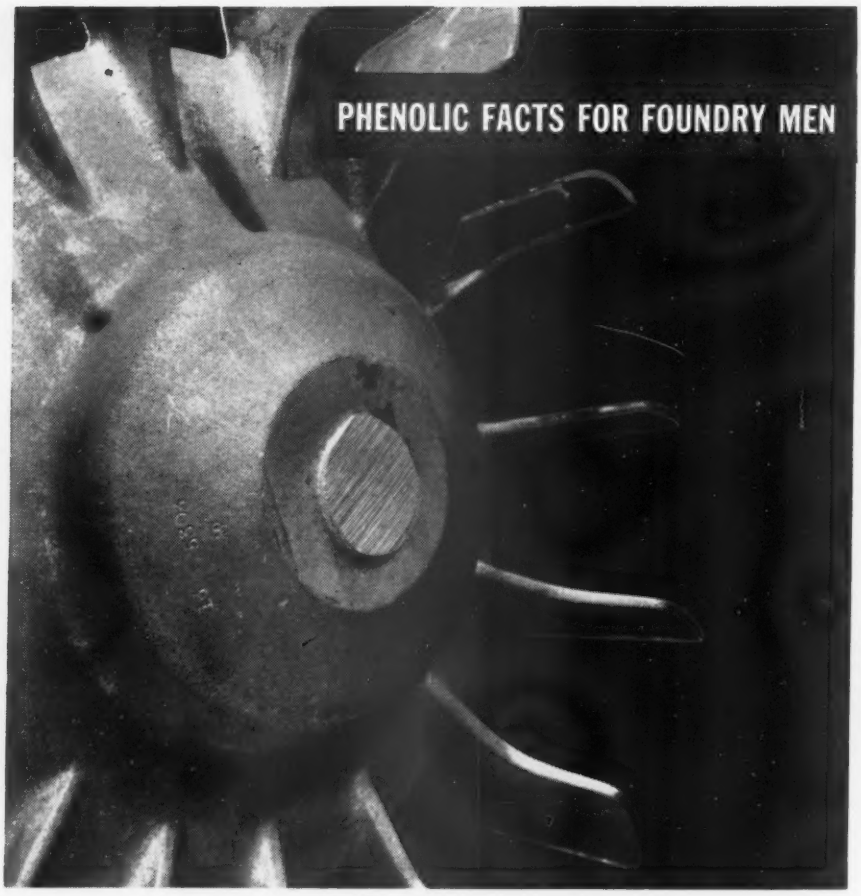
A survey of your sling requirements will cost you nothing. See your ACCO *Registered* Sling Chain distributor today or write our York, Pa., office for details. *Trade Mark Registered

WHAT "ACCO REGISTERED" MEANS . . .

1 The best material
2 Unit safety factor (on bodies, rings, links, hooks)
3 Proof test of complete sling to twice the working load limit
4 Actual field service test of each design
5 Metal identification ring on each sling
6 Signed Registry Certificate with each sling

ACCO
American Chain Division
AMERICAN CHAIN & CABLE
York, Pa., Chicago, Denver, Detroit, Houston, Los Angeles, New York, Philadelphia, Pittsburgh, Portland, Ore., San Francisco, Bridgeport, Conn.

plus Rings Links Hooks



Stronger shell molds...finer castings

Stepped-up cycles . . . Faster curing, more rigid, more warp-free shell molds can now be produced by using a new phenolic bonding resin developed by Durez. Whether or not you are using automatic equipment, the new resin enables you to turn out more molds per hour with no loss of quality in structural strength and gas-venting properties. Because of the greater hot rigidity, mold distortion is reduced. This results in greater dimensional accuracy in the casting, particularly at the parting line.

Less finishing . . . Pieces are cast to closer tolerances in shell molds bonded with our new resin. Castings have clean surfaces of almost pattern smoothness, require minimum finishing.

Where to use . . . Shell molding has proved to be economical on high production jobs as well as comparatively short runs. Gears, fittings, and other parts for industrial equipment and appliances are being cast with impressive savings in cost . . . and in various metals.

Have you read the new "Guide to Shell Molding"?

The most complete and up-to-date publication of its kind . . . 40 pages of practical information prepared by Durez to serve you in shell molding evaluation and application. Covers equipment, methods, procedures. For your copy . . .

USE THE COUPON ON OPPOSITE PAGE

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PHENOLIC RESINS

MOLDING COMPOUNDS

INDUSTRIAL RESINS

PROTECTIVE COATING RESINS

Specialists for 32 years in developing phenolic resins and plastics to meet the needs of industry.

DUREZ PLASTICS & CHEMICALS, INC.
1009 Walck Road, North Tonawanda, N. Y.

A third manufacturer, producing the same types of parts for blast furnaces, has been repairing them, using an inert-gas-shielded arc welding process with nonconsumable electrodes. It is felt, however, that by changing to a consumable electrode process, the company will speed the work enough to make the investment for the new equipment required more than worthwhile.

Cast-weld construction need not be limited to easily welded metals such as steel. The intelligent use of inert-gas-shielded arc welding using consumable electrodes is bringing many jobs on hard-to-weld metals back to the foundry. Parts formerly considered too difficult to cast and too expensive to weld when made of wrought metal can be redesigned to take the utmost advantage of cast-weld construction and can be fabricated economically in practically any foundry.

Shell Molding Operations Described in GE Film

Shell molding operations at General Electric's new experimental foundry in Pittsfield, Mass., are described in a 25-minute sound slidefilm. General Electric Co., supplier of resins and silicone release agents for the shell molding process, has installed the foundry for the purpose of studying and developing new molding techniques. The 35-mm color film is designed to acquaint foundrymen and buyers of foundry products with the latest benefits of shell molding. The film, "Shell Molding and You," gives the basic steps in the process and an explanation of the materials and equipment used. "Shell Molding and You" may be borrowed for showings by writing General Electric Co., Chemical Materials Dept., Pittsfield, Mass.

Safety Booklet Helps Small Business

Accidents reduce profits. How this happens is explained in the National Safety Council's new booklet "Plus Cost." Intended for small firms with few employees and no safety staff, the booklet sets down seven easy steps for eliminating accidents and suggests sources of help. The booklet explains how these common-sense principles make for a good safety program and at the same time increase production. The booklet may be obtained by writing the Small Business Program, National Safety Council, 425 North Michigan Ave., Chicago 11.

International Congress Opens Sept. 19

The 21st International Foundry Congress will be held at Florence, Italy, Sept. 19-26. The congress is organized by the Foundry Center of the Italian Association of Metallurgy.

Chairman of the congress will be Prof. Dr. Ing. Raoul Dupis, president of the Italian Foundry Association. Achille Brizon, past president of the Association Technique de Fonderie of France, president of the International Committee of Foundry Technical Associations, will officially represent foreign associations.

The Exhibition of Foundry Plant and Equipment, organized by the National Association of Suppliers of Foundry Plant and Equipment, will be held in conjunction with the congress. Area covered by the exhibition will be 10,000 sq ft. Thus far 52 firms have announced plans to take part in exhibit.

Additional exhibits of artistic subjects, antique craftmanship, historical and modern foundry literature, development of foundry education, defects and items relating to terminology also will be conducted.

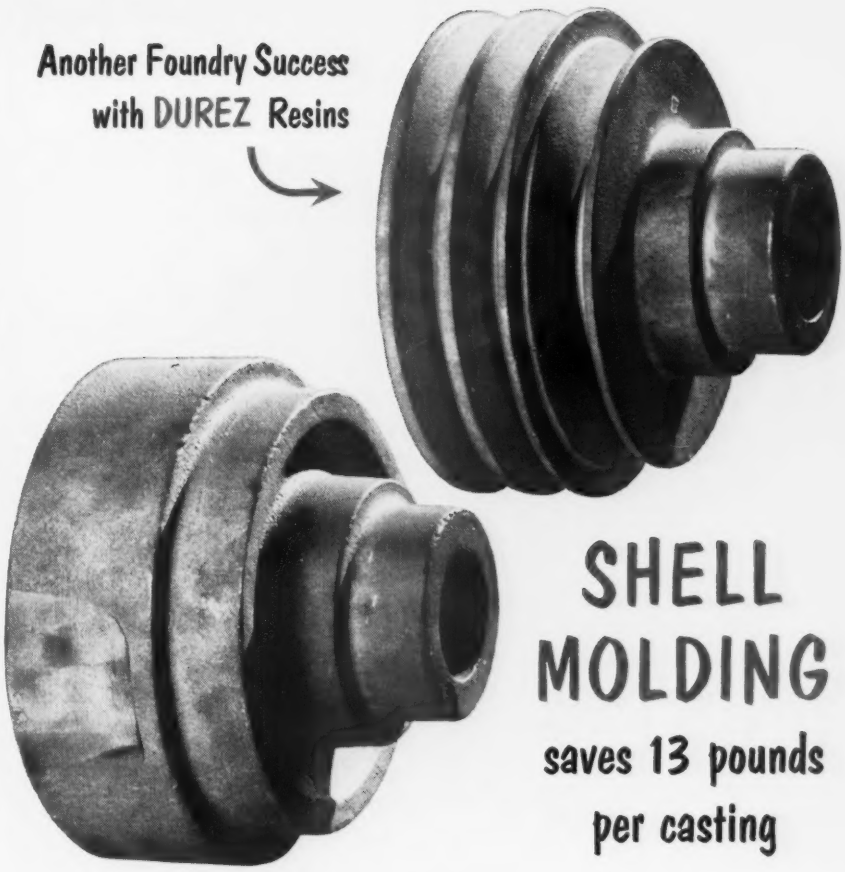
The program opens with registration and a reception on Sunday, Sept. 19. Technical sessions are scheduled for the ensuing six days. The final day also will include presentation of the International Committee award and the official banquet. Plant visits will be conducted during the week, while four tours to other Italian cities have been arranged to follow the congress.

Albion Malleable Films Casting Operations

A documentary-type motion picture, "Malleable Metals," showing the newest equipment and methods for high production of small castings, has been produced by the Albion Malleable Iron Co. With special emphasis on new techniques and through use of full color, the 16-mm. sound film brings the viewer into the foundry where core and mold making, pouring, annealing, drawing, cleaning and finishing of castings are highlighted.

The film, which has a running time of 13 minutes, is available for showing and may be secured from James W. Hallock, sales manager, Albion Malleable Iron Co., Albion, Mich. There is no charge except for postage required to return the film.

Another Foundry Success with DUREZ Resins



SHELL MOLDING saves 13 pounds per casting

One of the advantages of shell molding is evident in these multiple V-belt pulley castings. When made by green sand method the casting weighed 40 pounds before machining (left), while the unmachined shell molded casting (right) weighs only 27 pounds. On the latter the only surfaces to be machined are the V in the pulley and one face.

This pulley is one of several grey iron castings now being produced in shell molds by the Brillion Iron Works, Brillion, Wis., for one of their customers. Brillion uses Durez 16170, a resin with very fast cure and rigid set, and reports that this resin has helped them eliminate the shell warpage they used to get.

You too, can obtain strong, dimensionally accurate shell molds, high metal yield and high man-hour productivity more easily with Durez foundry resins. Send the coupon today for helpful literature and full information.

DUREZ

PHENOLIC RESINS

MOLDING COMPOUNDS

INDUSTRIAL RESINS

PROTECTIVE COATING RESINS

Made by America's largest producer of phenolic plastics exclusively.

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Company .....
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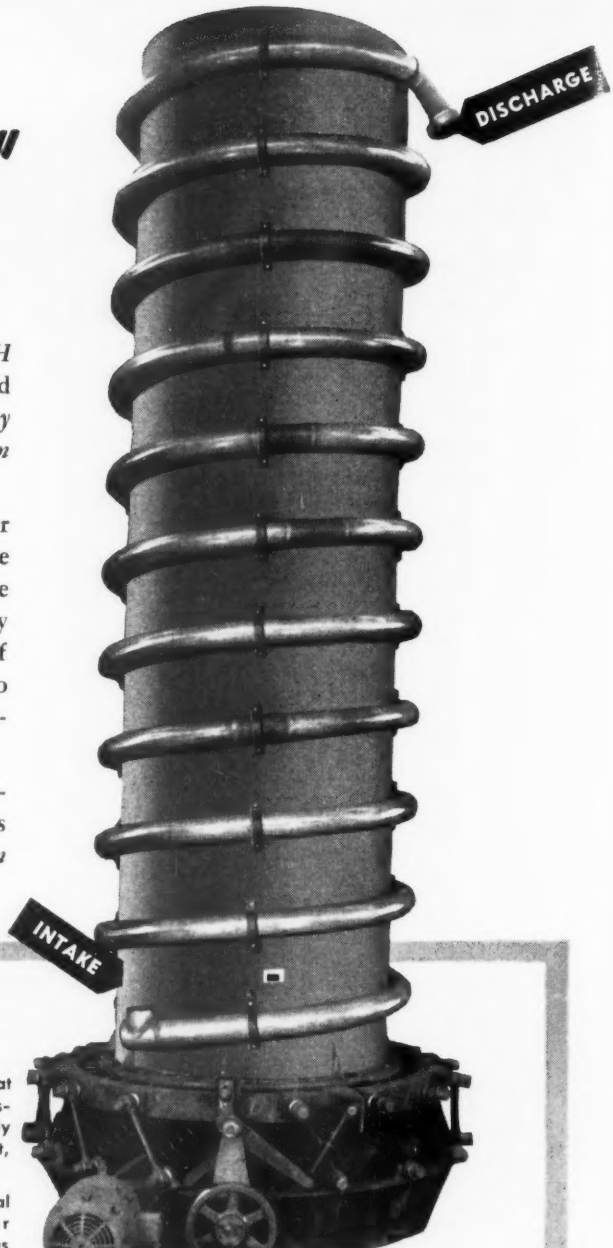
SHELL MOLD RESINS THAT FIT THE JOB

GOT AN "IMPOSSIBLE" CONVEYING JOB?

CARRIER Natural-Frequency Conveyors *(BOTH horizontal and vertical)* have all but revolutionized an important branch of the conveyor industry, *and they have done it by accomplishing "impossible" results on toughest products and processes.*

Natural-Frequency Conveyors differ from *all* other vibrating conveyors. Carrier Conveyors utilize the scientific laws of Natural Frequency, substituting the natural resonant action of springs for brute force. By *using* this harmonic Natural Frequency instead of "fighting it", Carrier Conveyors offer advantages so amazing as to seem impossible until you have experienced them.

Carrier Natural-Frequency Conveyors are now delivering spectacular performances for scores of America's biggest, most successful industrials. *Mail the coupon today for all the facts!*



For Instance—Rocket Fuel Conveyed Safely By Unique Carrier Spiral!

Rocket fuel powder is as temperamental and dangerous as a land mine. It's hydroscopic, quickly builds up heavy static electricity. Even the slightest contact with oil or grease will create a hazard. It is obviously a conveying nightmare for the manufacturer.

Handling (and elevating) rocket fuel is a cinch for the Carrier Spiral Vibrating Conveyor shown above. The powder is elevated through that totally-enclosed, spiralling, stainless-steel tube—elevated quickly, gently and safely, in a grounded, air-tight, self-cleaning conveyor.

This is just one of *many* unusual problems solved by a Carrier Natural-Frequency Conveyor. Tell us yours and see what we can work out for you. There's no obligation, of course!

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Carrier Conveyor Corporation
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Gentlemen:

Without obligation, please send me Carrier Natural-Frequency Conveyor Bulletin No. 111.

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CARRIER ADVANTAGES

HIGH CONVEYING SPEED
(Up to 100 feet per minute)

GREATER CAPACITY
(Up to 200 tons per hour)

LESS POWER REQUIRED
(About one-third as much as "competitive" equipment)

LESS MAINTENANCE & DOWN-TIME
(Less power + good design = trouble-free performance)

NO DAMPENING UNDER LOAD
(Designed with extra power for specified load, with positive stroke)

SELF-CLEANING
(Continuous, smooth trough — no pockets)

COMBINES PROCESSING WITH CONVEYING
(Can screen, dry, cool, dewater, blend, etc.)

WIDTHS FROM 6" TO 48"—LENGTHS FROM 5' TO 250'
(With pans 16 ga to ½" plate, of any metal, open or enclosed)

BALANCED, VIBRATION-FREE UNITS AVAILABLE
(For use on ceilings or light floor construction)

AROUND THE COUNTRY

NEWS REPORTS FROM

Los Angeles
Philadelphia
New York
Chicago

Los Angeles . . .

FOUNDRYMEN in this area are looking toward the second half with mixed feelings after a first half much better than anybody had dared predict in January. But despite the excellent first half, melters are worried that the summer slackening might carry into the fall.

One sign of this is a sudden decrease of inquiries reported by many shops. One foundry's August inquiries were 25 per cent less than in July While the decrease for other shops was less, almost all noted a sharp reversal in the trend that had previously seen inquiries climbing month after month.

Nevertheless, most foundry melting rates are above 80 per cent of capacity. One operator, a leader in the industry, reported his shop was operating at 93 per cent of capacity, but admitted that when current jobs are completed he might be forced to reduce his work week to four days unless prospects brighten.

The sudden influx of pessimism comes on the heels of July optimism. Most foundrymen who were anticipating a busy second half now will be satisfied if third and fourth quarter sales approach the good first half. Few feel that it will. "My customers had worked inventories down to the bone last winter," one operator says. "Now they're well stocked again from heavy spring purchases."

Of major interest to foundrymen was a report by the well-known Stanford Institute on the local smog situation. In a 134 page report to the American Petroleum Institute, the research organization placed a major portion of the blame on automobile exhaust and atmospheric conditions. The report directly contradicted political attacks on local foundries and other industrial plants as prime sources of smog. Earlier in the year a leading oil refinery decided to build its new plant outside the Los Angeles area to avoid the political treatment. Most industrial leaders welcomed the Stanford report as a vindication of their operations.

Philadelphia . . .

GRAY iron foundrymen are looking hopefully to September to bring an improvement in their business. Certainly by that time vacations and hot weather will be virtually over, and this should result in some betterment. However, as of the moment there is nothing tangible in the way of expanding orders.

Currently, gray iron shops which are not down for vacations are operating at around four days a week, with reduced working forces. Backlogs average less than two weeks. General exception among gray iron foundries are the pipe shops, which are operating a full five days a week and still have rather extended order books. For the record, August business is just about holding its own with July, which was the poorest month to date. Demand for paper making machinery continues fairly active.

Steel foundries are operating at around 60-65 per cent, with schedules averaging four to five days a week, but not full eight-hour days. Backlogs of some steel foundries are less than four weeks, which contrasts sharply with a year ago when four to six months was the general rule. Malleable shop operations are at around the same level; also backlogs. Apart from pipe fittings, virtually all lines of consumption are dragging badly.

Brass and bronze shops are experiencing a continued lull. Demand is spotty, and, at least insofar as the smaller foundries are concerned, it is touch-and-go to keep operations up to four days a week. Foundries producing special alloy castings are operating at a somewhat better rate, and this is also true of some of the light metal shops which are fortunate enough to have a fair amount of aircraft work on hand.

New York . . .

WINDING up what has been the slowest summer in recent years, foundry operators are hoping for some improvement in September, although there is little of a definitely tangible character in sight. In the past the end of the vacation season has usually meant some pickup in business and it is reasonable to assume that this will be the case this time.

Gray iron shops, when not down for mass vacations or excessively hot weather, have been operating at around 50 per cent of normal on an average. Few have been able to do better than four days a week, and then only with restricted working forces. Backlogs are virtually nil—perhaps a week or ten days at the most in several instances.

Steel and malleable shops are averaging a little better than the gray iron foundries. However, they are all scratching hard for business and are having difficulty in maintaining backlogs of more than four weeks.

Business with the brass and bronze shops is at a low ebb, with even the demands of the water meter manufacturers down from what they were earlier in the summer. Ship work remains quiet and valve and pump manufacturers are specifying lightly. Aluminum shops, engaged in aircraft work, are comfortably fixed, but those which are not are having a tough time keeping operations up to four days a week.

Virtually all raw materials are in plentiful supply.

Chicago . . .

WITH its production schedule completed, as previously reported in this column, the big magnesium foundry of the Ford Aircraft Engine Division here went into a semi-mothball status late in June. According to present contract stipulations, the foundry will be maintained by a special maintenance and standby crew, with all facilities prepared to return to full production at short notice.

During its 3½ years of operations, the foundry turned out 2,234,000 pounds of castings for the R-4360 reciprocating and J-57 turbojet engines it was making and for numerous aircraft customers.

When foundry production ceased, Clifford L. Wheeler, plant manager, expressed appreciation to the staff for the excellent job it performed. He said: "When we took over these facilities we were faced with what seemed an unsurmountable rehabilitation job. To make our task even more difficult we had a tough production schedule to meet.

Division Manager A. C. Moore also thanked the foundry staff and at the same time stressed that mothballing of the foundry facilities has no connection with operations in other manufacturing areas.

"This move," Mr. Moore said, "is the result of the great difference in foundry requirements between the R-4360 reciprocating engines and the

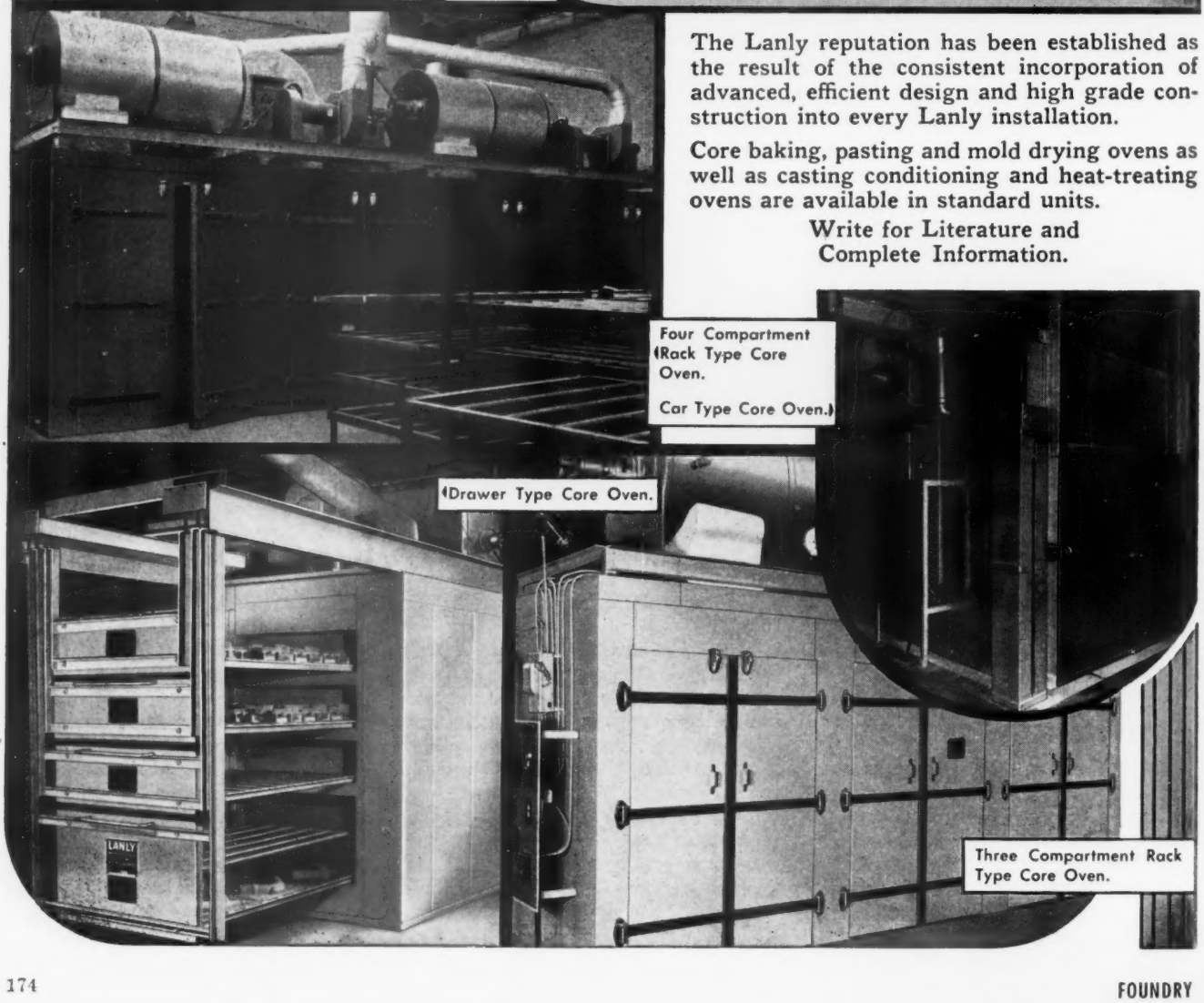
(Concluded on page 175)

Two Compartment Car Type Mold Drying Oven.
Two Compartment Rack Type Core Oven.
Single Compartment Rack Type Core Oven.
LANLY
FOUNDRY OVENS
THE LANLY COMPANY • 780 PROSPECT AVE
CLEVELAND, OHIO

The Lanly reputation has been established as the result of the consistent incorporation of advanced, efficient design and high grade construction into every Lanly installation.

Core baking, pasting and mold drying ovens as well as casting conditioning and heat-treating ovens are available in standard units.

Write for Literature and Complete Information.


Four Compartment Rack Type Core Oven.
Car Type Core Oven.)
Drawer Type Core Oven.
LANLY
Three Compartment Rack Type Core Oven.

(*Concluded from page* 173)

J-57 turbojet program which we are now entering. The R-4360 program necessitated a major foundry undertaking, while foundry requirements are limited under the jet program."

The division's foundry was rehabilitated into one of the most modern facilities of its type in this area. Under present plans, all conveyor lines, furnaces and coremaking equipment will be maintained. This will enable the equipment to be put back into action within a matter of days, whenever the need arises.

* * *

Some months ago, Whiting Corp., Harvey, Ill., closed its old foundry and converted the area into a fabricating shop for its monorail cranes. The foundry, which included two cupolas and a crucible furnace in the melting equipment, had been used for many years to produce castings for the company's products. Requirements of gray iron, brass and bronze castings now are being purchased from other sources.

Company Plans Addition

SPO Inc., 7500 Grand Division Ave., Cleveland 25, will add 7200 sq ft of factory production area to its present manufacturing facilities. The addition will cost in excess of $150,000 and will provide space for special handling equipment and additional overhead clearance needed for the production of the company's automatic molding unit and other foundry equipment. The company manufactures equipment for the fully automatic foundry, engineered to meet specific operating requirements, and offering a variety of capacities in the component assemblies.

Book Review

Characteristics and Applications of Resistance Strain Gages, National Bureau of Standards Circular 528, buckram, 140 pages, published by Government Printing Office, Washington 25, D. C. Cost $1.50.

This book contains 11 papers presented at a symposium held Nov. 8-9, 1951, which represent some of the latest results, both experimental and theoretical, in the study of resistance strain gages.

Resistance strain gages are a comparatively new tool in the study of materials and structures and have been used in measurement of mechanical quantities such as acceleration, impact force, and dynamic pressure. They have been applied also as the sensing element in a multitude of instruments, and have been used to determine strain distribution in structures.

Papers presented at the symposium reported new work in progress on strain gages consisting of a conducting coating applied by an evaporation technique, on special temperature compensated gages, on gages for strain measurements well beyond the elastic range, and on the application of strain gages to the determination of dynamic properties of materials and to the measurement of very large static forces.

Meetings of Interest to Foundrymen

Sept. 13-24—Instrument Society of America, International Instrument Congress and Exposition, Convention Hall and Commercial Museum, Philadelphia

Sept. 19-26—International Committee of Foundry Technical Associations, 21st annual International Foundry Congress, Florence, Italy

Sept. 21-23—Society for Experimental Stress Analysis, annual meeting and exhibition, in conjunction with first International Instrument Congress and Exposition, Bellevue-Stratford Hotel, Philadelphia

Sept. 27-28—Steel Founders' Society of America, fall meeting, the Greenbrier, White Sulphur Springs, W. Va.

Sept. 28-Oct. 1—Iron and Steel Exposition, Association of Iron and Steel Engineers, Cleveland Public Auditorium, Cleveland

Oct. 7-8—National Foundry Association, 56th annual meeting, La Salle Hotel, Chicago

Oct. 14-15—Michigan Regional Foundry Conference, University of Michigan, Ann Arbor, Mich.

Oct. 14-16—Foundry Equipment Manufacturers' Association, annual meeting, the Greenbrier, White Sulphur Springs, W. Va.

Oct. 15-16—Northwest Regional Foundry Conference, Vancouver, B. C., Canada

Oct. 16-19—Conveyor Equipment & Manufacturers' Association, annual meeting, the Greenbrier, White Sulphur Springs, W. Va.

Oct. 18-22—National Safety Council, 42nd National Safety Congress and Exposition, Chicago

Oct. 27-29—Grinding Wheel Institute & Abrasive Grain Association, fall meeting, Edgewater Beach Hotel, Chicago

Oct. 28-29—Purdue Metals Casting Conference, Purdue University, Lafayette, Ind.

Oct. 28-29—All-Canadian Foundry Conference, King Edward Hotel, Toronto, Ont., Canada

Oct. 29-30—New England Foundrymen's Association, New England Regional Foundry Conference, Massachussets Institute of Technology, Cambridge, Mass.

Nov. 1-5—American Society for Metals, National Metal Congress and Exposition, International Amphitheater, Chicago

Nov. 3-4—Investment Casting Institute, fall meeting, Congress Hotel, Chicago.

Nov. 10-12—Industrial Management Society, 18th annual time and motion study and management clinic, Sherman Hotel, Chicago

Nov. 11-12—Gray Iron Founders' Society, annual meeting, the Homestead, Hot Springs, Va.

Dec. 1-4—American Institute of Mining & Metallurgical Engineers, electric furnace steel conference, Hotel William Penn, Pittsburgh

1955

Feb. 10-11—Wisconsin Regional Foundry Conference, Schroeder Hotel, Milwaukee

Mar. 28-Apr. 1—American Society for Metals, ninth Western Metal Congress and Western Metal Exposition, Pan-Pacific Auditorium, Los Angeles

May 23-27—American Foundrymen's Society, 59th annual convention, Houston, Tex.

June 16-18—Malleable Founders' Society, annual meeting, the Greenbrier, White Sulphur Springs, W. Va.

TACCONE DIAFORM MOLDING MACHINE

makes available now to every foundry

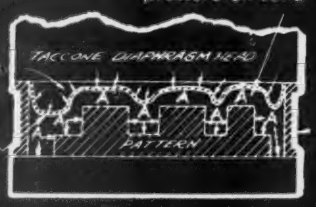
- ☆ High Pressure Molding
- ☆ High Speed Operation
- ☆ Low Machine and Pattern Equipment Maintenance

TACCONE PRINCIPLE

Pressure surface of diaphragm on sand is approx. 40% greater than the area of the flask

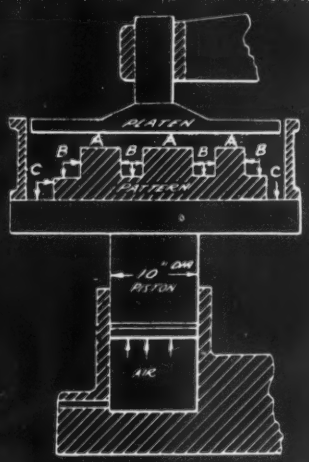
Flask size = 12" x 18"
Area = 216 sq. in.
216 + 40% = 302 sq. in.
302 sq. in. x 80# line pressure = 24,160#

24,160 pounds total pressure on sand



A—DENSITY OF RAM ESSENTIALLY IDENTICAL AT ALL POINTS

80 LB. LINE PRESSURE



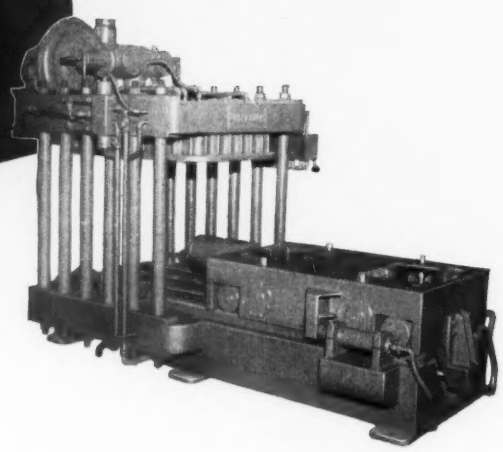
CONVENTIONAL SQUEEZE

A—HARD RAM
B—MEDIUM RAM
C—SOFT RAM

6,280 pounds total pressure on sand

Area of 10" dia squeeze piston = 78.5 sq. inches. 78.5 x 80# line pressure = 6,280#

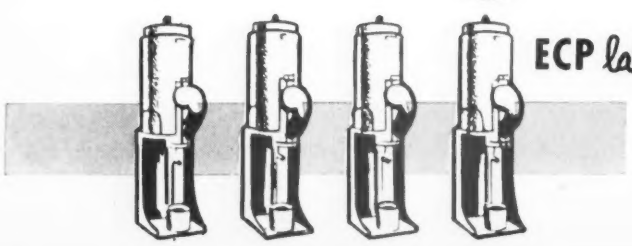
- HIGH PRESSURE MOLDING
- PRECISION CASTINGS
- LOWER PATTERN COST
- FASTER MOLDING
- LESS FLASK MAINTENANCE
- MOLD HARDNESS CONTROL
- UNIFORM MOLD HARDNESS
- LOWER COST MOLDING
- LESS AIR CONSUMPTION



Write for new folder

"Taccone Diaform Molding Machine"

Minerals International Chemicals



ECP laboratory control makes for uniformity

In addition to our own laboratories, four in number, we carry on tests constantly at universities, research institutes and private laboratories. Quality is dependably uniform from car to car.

FLOWABLE SAND

is a must

a must for...

maximum efficiency with diaform molding

a must for...

economy,
smooth finish, precision castings,
easy molding, casting tolerance,
high pressure molding, fast cleaning,
versatile molding, minimum rejects,
maximum production

Flowable sand must be combined with the strength, toughness and workability needed for *your* job. You can get it—by selecting from the eight different bonds and additives developed and manufactured by Eastern Clay. *Only* Eastern Clay produces a complete range of additives for flowability of sand. You can depend on our sand specialists for impartial recommendations . . . and for the correct additives for your particular applications. An Eastern Clay sand specialist will call promptly at your request.

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MAN-TO-MAN

By RALPH L. LEE

How To Build a 10-Inch Cupola

HAD anyone even tried to tell me how much information it would take to write just a once-over discription of our little 10-in. cupola, I wouldn't have believed him. When I saw all of the necessary dope piled up before me, I had visions of myself writing one of those confusing technical articles all broken up with treasure-hunt tips like "See A, B, C and D of figure 4 on plate I, II, III or IV after turning to page this or that." So I made up my mind that I wouldn't write an article at all, but would try to see what we could do with a chart and pictures.

There'll probably be some questions raised without answers, but in the main I think a person who was all het up with the idea of building one of these little fellows could manage with the following information.

Just a few things I'd like to tuck in though—our little cupola has been operating now for ten years or more with improvements being made as we've gone along. While it isn't perfected by any means, and probably never will be, it's well over the hump from the experimental stage.

Another thing: We had all kinds of trouble until we got sense enough to burn in the coke bed good and

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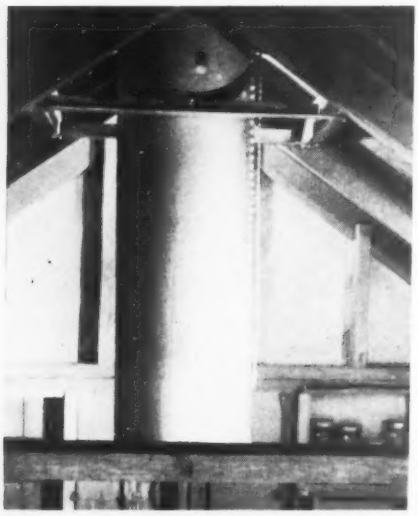
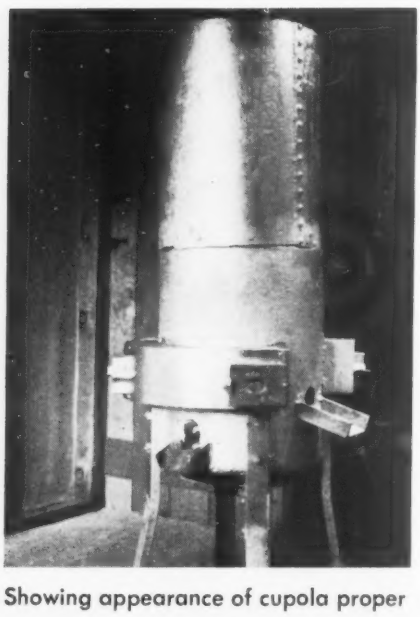
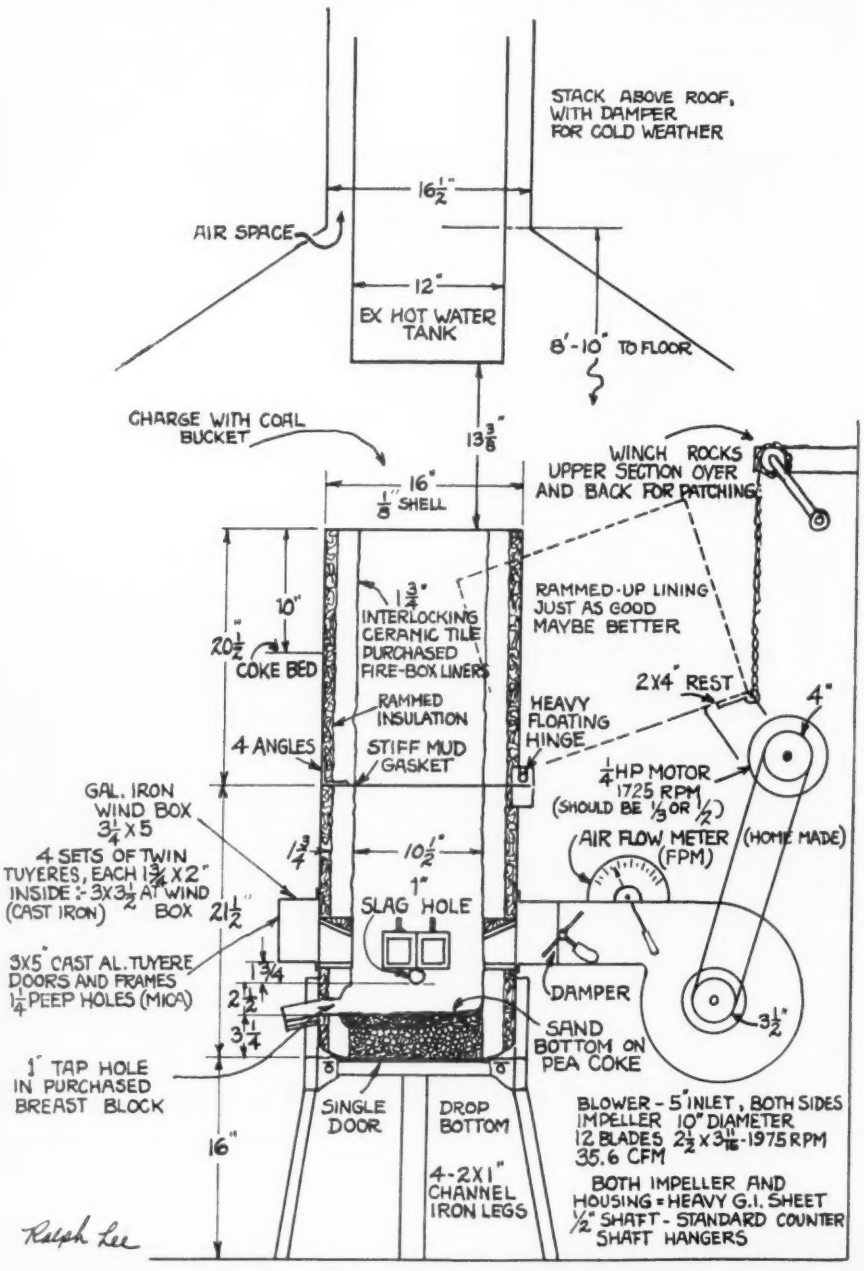


View of intermediate stack of cupola



Showing appearance of cupola proper


STACK ABOVE ROOF, WITH DAMPER FOR COLD WEATHER
16½"
AIR SPACE
12"
EX HOT WATER TANK
8'-10" TO FLOOR
CHARGE WITH COAL BUCKET
13⅜"
16" ⅛" SHELL
WINCH ROCKS UPPER SECTION OVER AND BACK FOR PATCHING
RAMMED-UP LINING JUST AS GOOD MAYBE BETTER
1¾" INTERLOCKING CERAMIC TILE PURCHASED FIRE-BOX LINERS
10"
20½" COKE BED
RAMMED INSULATION
STIFF MUD GASKET
4 ANGLES
HEAVY FLOATING HINGE
2X4" REST
4"
¼HP MOTOR 1725 RPM (SHOULD BE ⅓ OR ½)
GAL. IRON WIND BOX 3¼X5
4 SETS OF TWIN TUYERES, EACH 1¾X2" INSIDE :- 3X3½ AT WIND BOX (CAST IRON)
1¾"
10½"
AIR FLOW METER (HOME MADE) (FPM)
21½"
1" SLAG HOLE
3X5" CAST AL. TUYERE DOORS AND FRAMES ¼ PEEP HOLES (MICA)
1¾"
2½"
3¼"
DAMPER
SAND BOTTOM ON PEA COKE
3½"
1" TAP HOLE IN PURCHASED BREAST BLOCK
SINGLE DOOR
DROP BOTTOM
16"
4-2X1" CHANNEL IRON LEGS
BLOWER - 5" INLET, BOTH SIDES IMPELLER 10" DIAMETER 12 BLADES 2½ X 3 11/16 - 1975 RPM 35.6 CFM
BOTH IMPELLER AND HOUSING = HEAVY G.I. SHEET ½" SHAFT - STANDARD COUNTER SHAFT HANGERS
Ralph Lee

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(*Concluded from page* 178)

long because there's so much radiating surface in relation to heat produced. I also should mention that the breast was another bottleneck. Bringing that iron to as near the outside as possible, without burning through, helped one whale of a lot. So did shortening the spout—anything to conserve heat.

Then another thing—I air dry the ladle, good and dry, for one whole hot day, at least, then give it a two or more hour stretch in the core oven and heat it white hot before tapping. It's amazing how hard it is to drive out moisture. Time seems to be a greater factcr than heat.

A typical charge for the cupola includes 16 lb of cast iron scrap, 4 lb of pig iron, 1 lb of limestone and 4 lb of coke 1½ in. in diam.

For a typical heat, kindling was lighted at 11 a.m. The bed was built up and burned until 1:15 p.m., when the blast was turned on. First iron was down at 1:24, and first tap was at 1:35. Four charges were made.

Just one more thing. Any mention of miniature cupolas in polite foundry society is sure to bring out reports of iron being melted in anything from a hole in the ground to oil drums, and I'm sure that most of them are true. What I would like to make clear, however, is this: Our cupola was not built in a race to see how small one could be built and still work.

It was built to melt iron for castings. It has proved itself as a practical tool, and I wouldn't be a bit surprised to see an increasing number of these little fellows being built as time goes on, for melting research and for educational purposes, too. If this does happen, maybe we ought to organize the ASOTICU (American Society of Operators of Ten Inch Cupolas and Under).

View shows motor, blower, winch, air flow meter, manometer and slag spout

Roof stack completes installation

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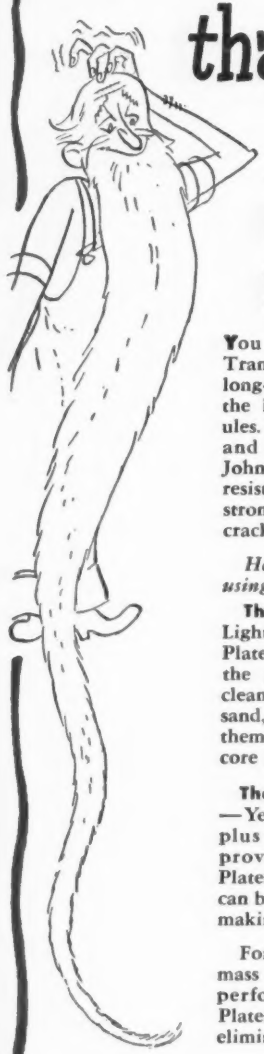

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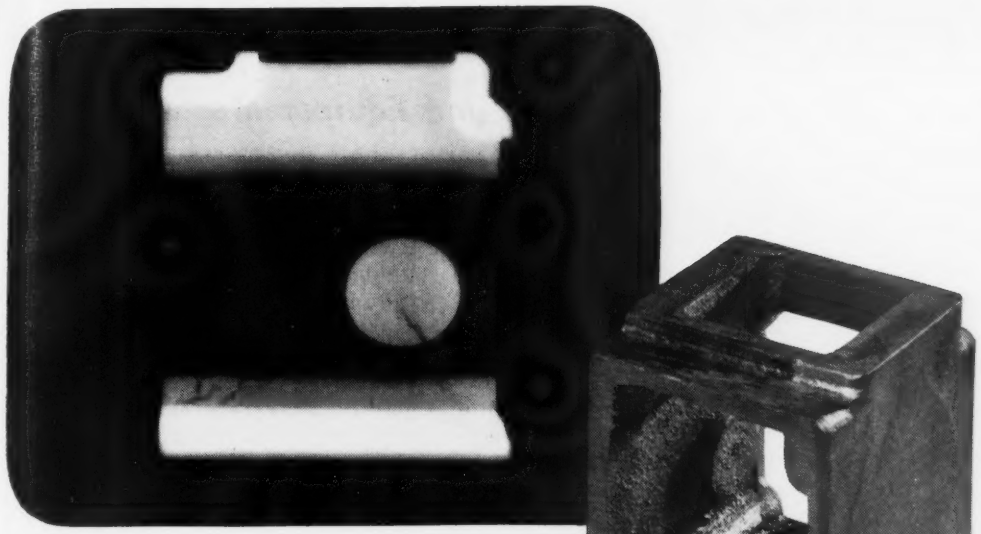
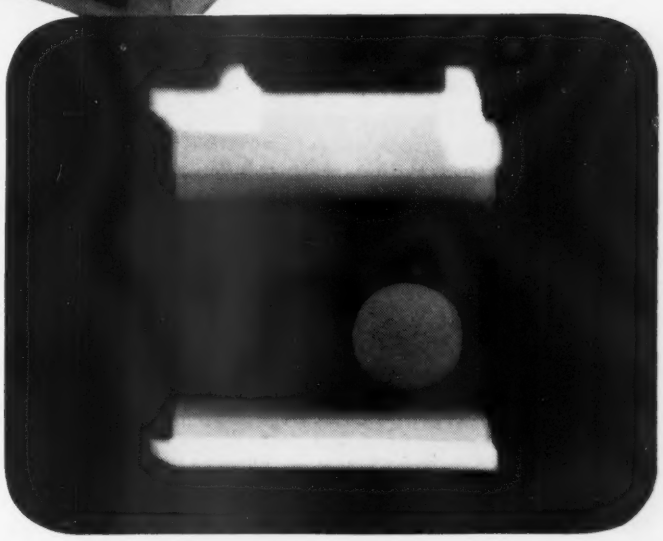


Radiograph shows recurring irregularities due to shrinkage.

RADIOGRAPHY

puts the finger on a profit thief



A change in gating produced sound castings.

Shrink was a problem in casting this instrument housing of 355 aluminum. It looked like the yield would run low.

But radiographs of pilot runs put the finger on the cause—revealed a pattern of recurring irregularities. This suggested a change in gating which, when adopted, quickly corrected the difficulty.

Cases like this show why more and more foundries make radiography a routine practice. It proves their work sound—helps build a reputation for consistently good castings.

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FIFTEEN PAPERS AT IBF CONFERENCE

Cover Foundry Methods, Materials and Equipment

By VINCENT DELPORT
European Manager

FIFTEEN papers were presented at technical sessions of the 51st annual convention of the Institute of British Foundrymen at Glasgow, Scotland, including the exchange paper of the American Foundrymen's Society. Harry W. Dietert, Harry W. Dietert Co., Detroit, presented the paper, which was entitled **'D' Process for Precision Castings.**

After a discussion of the basic principles and advantages of precision casting and a review of the various methods available, Mr. Dietert described the D process, a method of forming shell molds which utilizes normal foundry equipment and drying oil binders. (See FOUNDRY, July, 1953, p. 169, for a full description of the process.) Mr. Dietert stated that the number of castings made by precision casting methods will steadily increase. A general increasing demand already is evident for the precision type of castings, and those present-day founders who have a precision casting department will undoubtedly see it grow.

First of the other papers was the initial report of subcommittee T.S. 43 of the Technical Council on Cupola Development. Terms of reference were, "To investigate the hot blast system, carburization, desulphurization, water cooling and combinations of these." Chairman of this subcommittee is E. S. Renshaw, Ford Motor Co., Dagenham. Main claims cited in the report for hot blast systems include fuel economy by reduction in consumption or by satisfactory use of coke of lower quality; increased melting rate; high tapping temperature; increased carbon pickup by scrap; decreased losses of silicon and manganese; reduced sulphur pickup; and decreased losses of metal by oxidation. The committee agreed that these claims are largely substantiated.

In regard to water cooling cupolas in cold blast practice, application of water cooling methods to the melting zone was said to have been prompted by several reasons: For economy in refractory materials and corresponding reduction in labor repair costs; to reduce downtime for repairs and to make possible prolonged operating periods; to retain constant diameter in the melting zone; and to obtain a greater degree of control of slag composition by reducing the absorption of refractory material into slag.

In dealing with acid practice, it was found that danger of corrosion around water jackets under prolonged operation was reduced greatly by use of projecting water-cooled tuyeres. In regard to basic practice, the report states, "Application of water cooling to the basic lined cupola offers a possible solution to the lining problem, and further work in this direction is strongly recommended."

Discussing desulphurization and carburizing in the basic cupola, the report states that "basic slag operation offers the most effective means yet available for carburization and desulphurization of cupola charges . . . Scrap iron charges can be melted repeatedly without the progressive sulphur pickup associated with melting under acid slags." It further states that low carbon or high steel melts will carburize to high levels of carbon when slag basicity is increased and sufficient coke is present to provide the carbon for absorption and to produce reducing conditions. Desulphurization and carburization take place concurrently, and the extent of each reaction depends on proportion of coke to flux.

The last section of the report deals with hot blast water cooled cupola operation. It was reported that application of extensive water cooling virtually solves the refractory problem, making possible much longer melting periods and greatly reducing downtime for repairs. Use of hot blast compensates for the heat lost by water cooling, and fuel economy becomes of secondary importance to the metallurgical effects obtainable.

F. A. Woolley, chief chemist and metallurgist, Midland Motor Cylinder Co., contributed a paper entitled **Design and Operation of a Modified Cupola.** He described how the normal cupola furnace, as used for melting high duty gray iron for the manufacture of automobile castings, has been modified by providing auxiliary electric heating to the contents of the well. This additional heating, independent of the main source of heat developed in the melting zone, is used to correct any irregularities that arise in that zone during the normal blow that are reflected in lower temperature or a loss of fluidity in metal tapped.

Quantity of heat applied to the well is determined by the input of power, which in turn is controlled by a suitably designed transformer. Low voltage, high amperage electric current from the transformer is led through walls of the well by carbon electrodes so arranged that they project horizontally a short way into the coke contained in the well, which serves as a kind of resistor. Besides providing a convenient and rapid method of temperature control, experience gained suggests that the additional heating has important effects upon composition and casting properties of metal tapped. Indications are that chemically reducing reactions between oxides that collect in the slag and excess of carbon present in the coke are stimulated and that slags low in iron oxides result.

Metal under such slag shows a reduced tendency to "throw" chill and appears to be able to yield a greater pickup of carbon. With heavy input of power, evidence of a positive increment in silicon has been observed. Use of this modified cupola has been found to improve the service of metal to the pouring stations and to widen the range of raw materials that it has been possible to utilize when supply of these materials has been a major problem. In the discussion, the author said that the method could be made automatic by thermocouples, but would involve a higher cost of wear and tear of thermocouples. On the other hand, wear and tear on electrodes is very small. Over a period of 30 weeks, reduction of silicon was in the region of 0.1 per cent.

Cupola Practice: Second Thoughts was the title of a paper by W. Y. Buchanan. The author presented a paper to the Scottish branch of the institute in 1935 in which he gave details of the installation and performance of a 45-in. balanced blast cupola. He indicated that furnace would hold its place for the next 20 years in face of the competition from rotary furnaces. The new paper continued the history of the life of this cupola and listed some improvements added during the last few

(*Continued on page* 184)

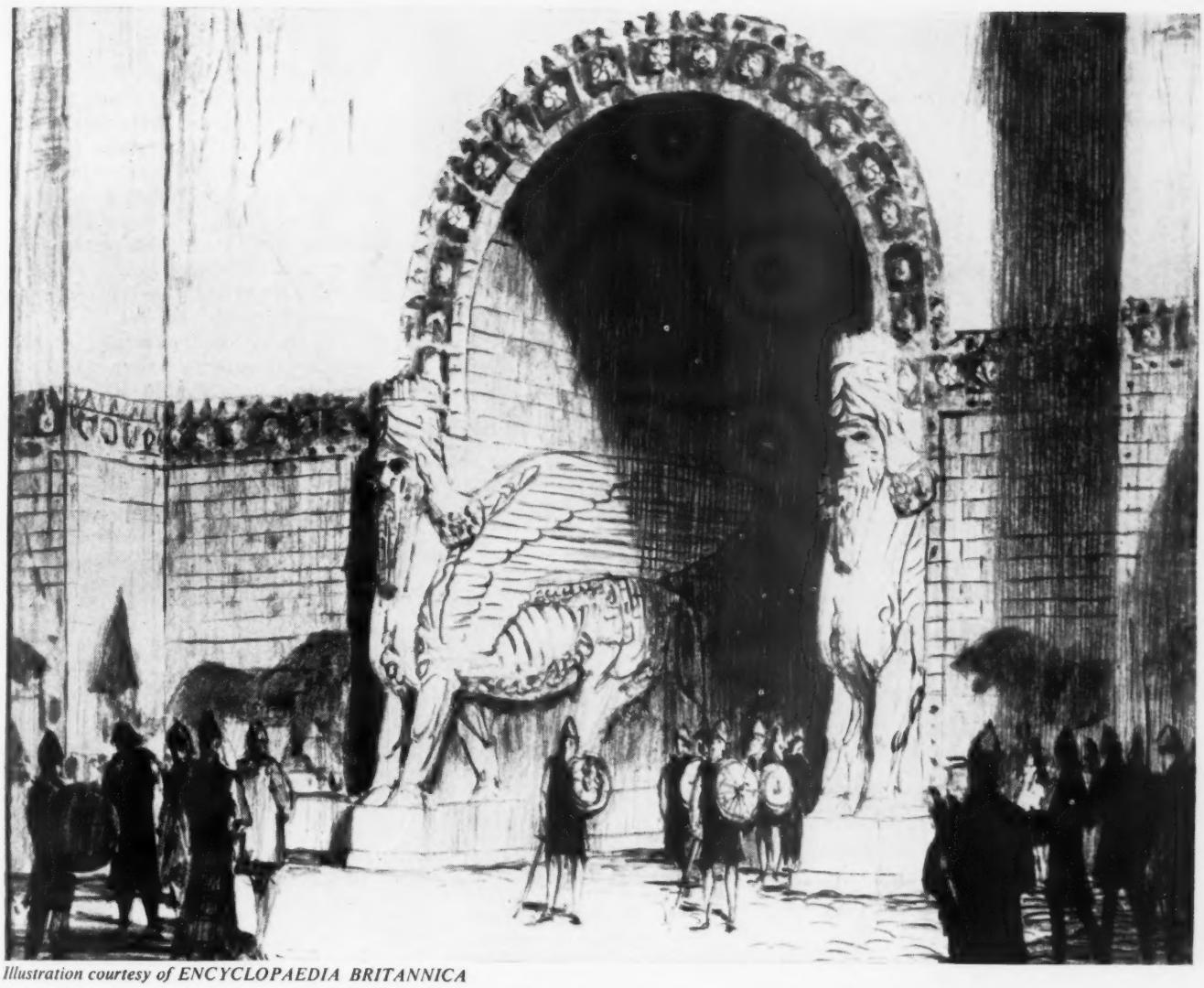

Illustration courtesy of ENCYCLOPAEDIA BRITANNICA

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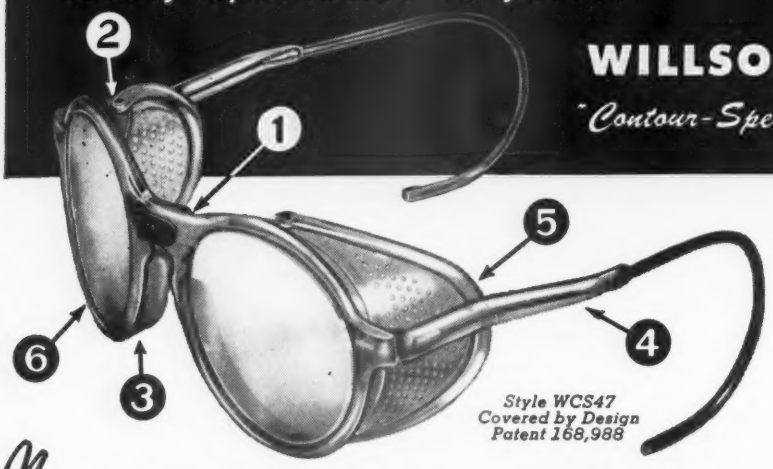

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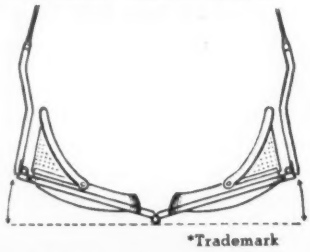

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(*Continued from page* 182)

years. Discussion covered lining life, pneumatic patching, furnace technique, methods of charging and the use of spark arresters. The paper contains interesting remarks on use of continuous runners from the cupola, of an air-weight regulator, of a sloping charging platform, and of a movable platform suspension and winding gear, combined with a spray gun for patching the cupola.

Dr. D. V. Atterton and C. Edmonds, Foundry Services Ltd., Birmingham, contributed a paper on **Theory, Economics and Practical Application of Exothermic Materials.** The authors discussed feeding of both nonferrous and ferrous castings. The first section covered factors that influence directional solidification in a casting. The surest way to obtain casting yields of the order of 90 per cent is to introduce heat into the feeder head metal and to insulate it to a very high degree, preferably by a hot, low thermal conductivity sleeve.

Relative merits of thermit type material and moldable exothermic material on steel castings were discussed, with a brief account of their applications. Several possible ways of considering the cost of exothermic materials were proposed. It was suggested that, in addition to the direct value of the melting cost of the metal saved minus the cost of the exothermic material, consideration must be given to other factors, such as increased foundry output.

Jeffrey Bernstein, Simplex Electric Co., Birmingham, spoke on **Modern Production of Whiteheart Malleable Iron.** He described briefly the changeover from a standard range of castings, 3/32 in. to 1 in. thick, weighing from 7 grams to 14 lb, annealed in ore in a coal-fired furnace, to a wider range and increased output of malleable iron castings which weighed from 7 grams to over 400 lb and were annealed in controlled atmosphere, electrically heated furnaces. By the application of chemical control, annealing times were reduced by changing the form of distribution of carbon in the thicker castings, rather than by attempting advanced decarburization. Mechanical properties complying with requirements of appropriate British standards specifications are attainable by that method. Melting equipment consisted of twin, balanced blast cupolas lined to 27-in. diam.

Metallic Arc Welding of Spheroidal Graphite Cast Iron was the title of a contribution by F. A. Ball and

(*Continued on page* 186)

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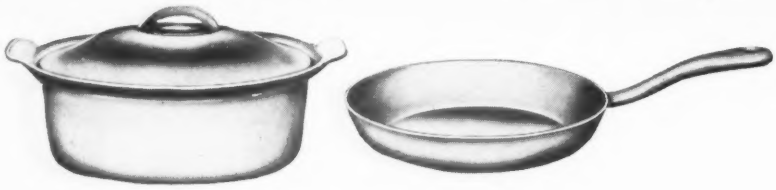

Enameled Gray Iron Cookware Expands Market for Castings

By ROBERT H. HERRMANN
Associate Editor

THE market for castings has been expanded by Prizer-Painter Stove Works, Reading, Pa., through successful development of high-quality, baked-enamel-coated, gray iron household cookware. Sales of the new ware have pyramided each month since it was placed on the market last October.

At present, all cookware castings are produced in the company's jobbing shop—Keystone Grey Iron Foundry Co., Pottstown, Pa.—and transported to the Reading plant for finishing. New equipment, however, has been purchased to reactivate an unused foundry section at the Reading plant. Production here will be totally in cookware and is expected to begin in October.

The product's secret of success is in the enamel formulation stumbled upon almost by accident after more than a year of research by Company President L. E. Bilger and his associates. Enamel is applied directly to the iron utensils with no ground coat. Ranging in thickness from 0.007 to 0.010-in., it has a smooth, glossy finish, and in outside laboratory tests it has not chipped or cracked when hit with a hammer or heated to 900° F and quenched in room temperature water.

Section thickness of the sand castings is 0.10-in. They are poured at 2750-2800 °F with gray iron containing 2.25-2.30 Si, 0.40-0.45 P, 0.50-0.55 Mn, 0.08-0.09 S and 3.50 TC. Charges consist of 60 per cent pig iron, 25-30 per cent returns, the balance being cast machinery scrap.

A No. 1 Albany molding sand is used with 5½ to 5¾ per cent moisture. A proprietary graphite sand additive for increased metal flowability is added on the basis of 2 per cent to used sand and 3 per cent to new sand.

Currently about 2000 individual utensils are cast daily. Frying pans account for approximately 900 items. Fifty-seven other types of utensils make up the line. Total weight in finished castings is estimated at 4 tons daily.

L. E. BILGER

(*Continued from page* 184)

D. R. Thorneycroft, Mond Nickel Co. The authors described mechanical properties of joints prepared by metallic arc welding with nickel-iron and aluminum-bronze electrodes and results of a detailed analysis of structures of both weld metal and adjacent cast iron. They examined the relationship between properties and microstructures and how they are affected by heat treatment. Application of the procedures developed during this investigation was discussed for the welding of spheroidal graphite iron in both pearlitic and ferritic conditions.

Crackfree joints can be obtained with nickel-iron electrodes in both pearlitic and ferritic iron. Restrained joints can be arc welded with the aluminum-bronze electrodes so that they are free from visible cracking, but joints so prepared have poor mechanical properties which are not improved by heat treatment. With the nickel-iron electrodes, heat treatment after welding gives a fully machinable joint. Replying to some objections made during the discussion, the authors said that investigations were being made in regard to corrosion near the joints. Use of metallic arc welding avoids the necessity of preheating, whereas use of a metal closer to that of the plate metal requires preheating. Many castings, however, still require heat treatment after welding.

E. R. Evans, British Cast Iron Research Association, discussed **Defects in Vitreous Enameled Iron Castings.** Some defects are directly attributable to faulty techniques in the foundry and the enameling shop, but others could be reduced by improved control. Better inspection in early stages of the process would avoid processing of some castings which would give trouble. However, some defects cannot be detected until after enameling. These defects usually take the form of blisters, pinholes, boil or black specks which are due to gas evolution from the vicinity of the iron enamel interface.

Microexamination of defective areas sometimes reveals subsurface defects which account for troubles, but in many cases little is revealed by that technique. A mechanism of formation of blister gases was discussed, together with factors which influence it. The author indicated that long storage periods should be avoided because of the danger of rust penetration which, once it occurs, is likely to cause trouble unless it is removed by surface grinding or some similar operation.

R. S. M. Jeffrey and J. A. Richards, Federated Foundries Ltd., contributed a paper on **Die Pressing of Gutters.** After a review of early experiments, the authors described the die assembly which was adopted: Two halves hinged together with a handle on the top die for operating purposes. Eventually it was found possible to use dies 6 ft long. Dies are of Meehanite iron, completely machined. Operation and control of the machine were discussed, as well as a review of properties of the castings obtained. All samples of castings examined under a microscope showed a fine, undercooled graphite structure.

Simple Foundry Expedients Proved Worthwhile in Recent Years was the title of an unusual paper by J. E. O.

(*Continued on page* 188)

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(*Continued from page* 186)

Little. This takes the form of a collection of ideas from the foundries of two firms: Glenfield & Kennedy, Kilmarnock, Scotland, and J. W. Blakeborough & Sons, Brighouse, Yorks. Some of the ideas were necessary because existing equipment was called upon to handle increased output or had to be adapted to suit the working of a mechanized plant. In some cases accident prevention promoted the adoption of simple innovations. The hints given covered such problems as dealing with hard tapholes; protecting drop bottom doors of the cupola against the white hot coke bed with specially contrived springs; and the admission of oxygen to the fan intake of a coke-fired crucible furnace for melting high chromium iron.

In one case, an oil-fired rotary furnace is used to melt down large heads which have been cut off heavy castings. A very high superheat was imparted to the metal so that it could be used to raise the temperature of cupola metal collected for casting heavy work. A special refractory developed for ladles was comprised of old plumbago crucibles from the brass foundry, crushed in a pan mill. One part of this material ground up with two parts of normal ladle daubing was used. Other ideas covered simple molding and patternmaking improvements; special stools with rotatable guards for the dressing shop; and a safety device for roller conveyors.

An impressive colored film accompanied a paper by S. Taylor, technical assistant to the steel foundry manager, English Steel Corp., Sheffield, on **Production of Heavy Steel Castings.** The paper and the film described production of a 185-ton press casting, a description of which appeared in FOUNDRY, Nov. 1953, p. 110. The paper described the process planning, patternmaking problems, molding operations and coremaking, closing and binding of the mold, the pouring operation, annealing and dressing. Pouring of this steel casting, with one center and two end ladles, went at the rate of approximately 11 tons per minute, the whole operation taking 19 minutes, during which 206 tons of liquid steel were transferred to the mold. Molding took about 900 man-hours, closing the mold about 400 and the coremaking operation some 600 man-hours.

N. B. Rutherford, British Nonferrous Metals Research Association, contributed a paper on **Pinhole Porosity in Brass and Gunmetal Castings** in which he stated that the pinhole porosity sometimes found in those castings for plumbing fittings has been traced to a form of metal mold reaction associated with the use of wheat flour as a mold dressing or sand addition. Wheat flour frequently is used to improve the surface finish of castings which are to be polished and plated. A number of alternatives to wheat flour have been tried, and pelleted pitch incorporated in the molding sand has been found to give a satisfactory surface finish to castings without giving rise to pinhole porosity.

In his conclusions, the author stated that the defect appears on castings ¼ in. thick at above 2120°F. Lead-free gunmetals are for all practical purposes immune from pinholing. The metal-mold reaction may be prevented by spraying the mold with aluminum-magnesium paint, but this method does not give as good a finish as wheat flour. The incorporation of ½ per cent of pelleted pitch is satisfactory and makes for ease of stripping. Several proprietary mold coatings also give good

(*Continued on page* 190)

DUREX

"DUROX" and "D • SAVAGE"
Standard Fire Brick Products
Proven by Actual Foundry Service

FIRE CLAY
FIRE BRICK
BONDING CLAY
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FOR CUPOLA MAINTENANCE OR ELECTRIC FURNACE LININGS

The most economical and efficient air-placement gun. Ruggedly built for years of service with minimum repairs. Installation, demonstration and training to your own men by our own engineers.

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"Duregan" can be used in all types of guns on the market today. It is carefully screened and sized to insure maximum density with minimum rebound. All quartz particles thoroughly coated to assure a strong bonded lining and long-life refractory service.

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to volume sales in
a five billion dollar market

Foundry's PLUS 5 SERVICE

helps you keep ahead of competition

What is PLUS 5? It's your key to more business from foundries. It gives every FOUNDRY advertiser a bonus he can get from no other source. Here is help in analyzing this market—studying sales territories and potentials—planning the sales effort—and creating a constructive promotion program to the 5 billion dollar foundry market. It's time to take a new look at this market—and at the unusual selling aids we have for you. Say PLUS 5 to your FOUNDRY representative and he'll show you this 5-step program designed to move more of your products into foundries.

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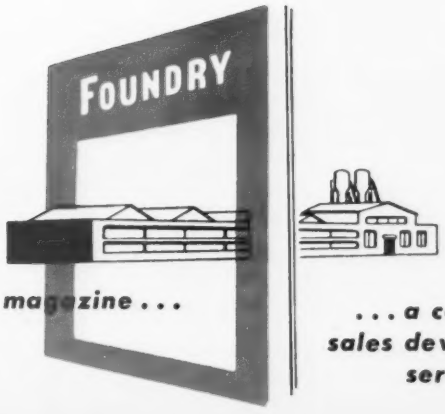

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THIS FOUNDRY "INCREASED FLOOR SPACE" WITHOUT RE-BUILDING!

Faced with a production bottle-neck because of a lack of operating space, Chris Erhart Foundry and Machine Co., 1237 W. 6th St., Cincinnati easily solved its problem by the installation of an Alvey-Ferguson *Engineered* Conveying System.

Now, molds are poured right on the A-F "complete oval" gravity roller system which is also used as a live storage bank for as many as 40 molds at a time. This, plus the installation of molding machines, has boosted production facilities to the satisfaction of all Erhart officials . . . and because molds no longer have to be carted, employees are happier too.

A-F Engineers can help *you* save money in handling flasks, molds and castings. Write without obligation — for a discussion of latest efficient methods — today.

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Azusa, California

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105 Disney Street — CINCINNATI 9, OHIO
Offices or Representatives in Principal Cities

Since 1901 — FIRST IN ENGINEERED CONVEYING SYSTEMS

(*Continued from page* 188)

results.

A paper by Dr. R. V. Riley and B. T. Gillyatt, Staveley Iron and Chemical Co., Chesterfield, described **a Centrifugal Method of Metallurgical Research,** which uses a centrifuge designed for use with molten cast iron. The apparatus is capable of exerting a centrifugal force of over 1000 grams upon small specimens of cast iron, which were melted, maintained molten and allowed to solidify while still under this high force. Temperature measurements were made throughout the experiment so that a cooling curve could be plotted, and upon the completion of the run, the solid specimen was removed for a full metallurgical examination.

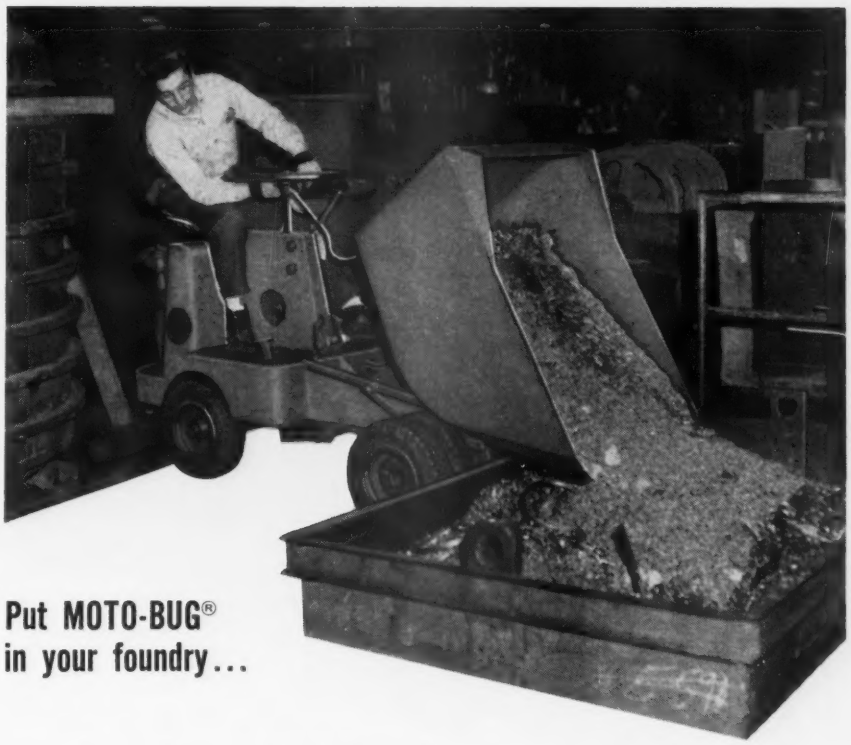
Chemical, spectrographical and gas analyses were carried out, and a longitudinal cross section of the ingot was sulphur printed and macro and microscopically examined. With the aid of this equipment, research was made into several fundamental aspects of the metallurgy of phosphoric gray cast irons. The action of high pressures upon the iron during solidification resulted in a liability to carbide formation, especially in the form of "inverse chill" and hard spots. The agglomeration of phosphides was observed due to the combined influence of high pressure and thermal currents. Results aroused some views upon the nature and distribution of sulphides in iron. Changes in gas content occurred because of the centrifuging, but were relatively small.

Dr. B. G. Davies and T. Evans, Department of Metallurgy, University College, Cardiff, contributed **Solubility of Hydrogen in Iron—Carbon Alloys.** They determined the equilibrium value of the solubility of hydrogen in iron-carbon alloys of carbon content up to 3.4 per cent, over a temperature range from 1112 to 1832°F at a pressure of one atmosphere. In their conclusions, the authors state, "It would seem, from the values obtained, that the solubility of hydrogen in iron-carbon alloys of carbon content 0 to 3.4 per cent carbon are of the same order over the temperature range studied, the values at 1832°F being around 5 to 7 parts per million. There is evidence of a minimum at 0.55 per cent carbon or thereabouts and of a maximum of 1.3 to 1.8 per cent carbon according to temperature. Gray irons seem to have higher solubilities than white irons of similar carbon content, the difference being of the order of 1 to 1½ parts per million."

An exchange paper from the Sveriges Mehanforbund was presented by Erik O. Lissell, Bjorneborgs Jernverks A.B., and Morris Itzel, Federation of Swedish Mechanical Engineering Industries. The subject was **Correlation of the Properties of Castings and Test Bars in Gray Cast Iron.** Fundamentally, tentative Swedish specifications for cast iron are drawn up for determination and control of the quality of the iron to provide a tool for production control and, to a lesser degree, for inspection control. A single test bar is specified to be cast under closely controlled conditions and machined to a standard tensile test specimen of set dimensions. The ultimate goal is to make cast iron testing as uniform as possible, irrespective of the particular foundry, so that different grades of cast iron are identical throughout the country. It is, however, not only important that the various foundries produce irons of controlled quality to fulfill certain specifications, but also that the designer should know which one of a number of grades of specified irons to use for his castings.

The Swedish Gray Iron Standards Committee therefore has worked out a data sheet giving the minimum strength to be expected in various sections of actual castings for each of the standardized grades. Since only one test bar is used to designate the iron, the approach to the problem of correlating test bar and casting properties has been somewhat different from that used in other countries. The authors suggest that the work on heat transfer and cooling rates should be extended into the field of cast iron testing as a possible means of calculating relationships between different shapes and of predicting strength in different kinds of castings.

"Oh, Mr. Wilcox, what cold hands you have!"



Put MOTO-BUG® in your foundry...

haul 1-TON loads with 1-man economy

You can earn substantial savings in time and labor with one of these Kwik-Mix Moto-Bugs in your foundry. Big 4-wheel model shown above carries up to 2000 pounds, or 15 cu. ft. of bulk materials each load . . . hauls sand, scrap, slag, coke, small castings or any other materials you shovel, stack or load in the gravity-dump hopper.

85% of loaded weight on front drive wheels, and 8.3 h.p. gas engine, provide plenty of tractive power to climb 16% grades, carrying maximum 1-ton load. Moto-Bug also can be used as a small tractor. Fully loaded, it gives you 550-lbs. drawbar pull for towing wagons or carts.

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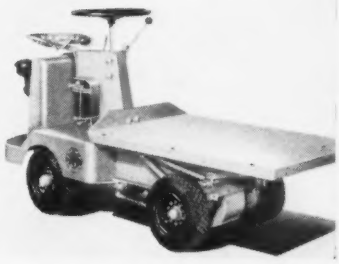

Change hopper body to 4½-foot platform, and you have a 1-ton truck. Dual drive tires are available (pneumatic or soft-core.)

Also check smaller, 6 h.p. Moto-Bug, 3-wheel type. Has 10 cu. ft. hopper . . . interchangeable ¾-ton platform, and the ½-ton capacity fork lift attachment.

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OBITUARY

DR. HARRY A. SCHWARTZ, retired manager of research, National Malleable & Steel Castings Co., Cleveland, and one of the nation's leading malleable iron metallurgists, died there July 25.

Born in Oldham county, Ky., in 1880, Dr. Schwartz was graduated from Rose Polytechnic Institute, Terre Haute, Ind., in 1901. He earned a master's degree in science there in 1903 and a degree as a mechanical engineer in 1905. In 1902 he joined National Malleable at its Indianapolis plant and served as a draftsman, chemist, metallurgist, and assistant superintendent. In 1920 he went to Cleveland to establish a department of research, of which he was manager until retiring in 1953. Since then he served in an advisory capacity as assistant to the vice president in charge of production.

Author of numerous articles and prepared papers, Dr. Schwartz also was the author of *American Malleable Cast Iron* and *Foundry Science,* both standard reference works widely used by schools and industry.

Dr. Schwartz was often honored for his contributions to the malleable iron industry. In 1931 he received the John A. Penton Gold Medal of the American Foundrymen's Society, and in 1939 he was awarded the E. J. Fox Gold Medal of the Institute of

DR. HARRY A. SCHWARTZ

British Foundrymen, the only American ever to receive that honor. The Malleable Founders' Society presented him the Charles H. McCrea Medal in 1951 for his contributions to the industry. He had also received honorary degrees from Rose Polytechnic Institute and from Case Institute of Technology, where he was a lecturer.

For many years Dr. Schwartz was a member of FOUNDRY's editorial advisory staff.

* * *

Paul J. Jurack, 66, president-treasurer, Charles Jurack Co., Milwaukee pattern manufacturer, died July 29. With the company over 40 years, Mr. Jurack became president in 1936 after the death of his father, Charles Jurack, who founded the company in 1894.

* * *

Joseph J. Fox, 62, sales representative, Wisconsin Steel Division, International Harvester Co., Chicago, died there July 19. He had been associated with the company over 40 years.

* * *

Arthur L. Perlick, 57, for 15 years secretary-treasurer, Perlick Brass Co., Milwaukee, died July 17. His father, the late Robert Perlick, founded the business.

* * *

Elbert H. Bounds, 62, treasurer, Lufkin Foundry & Machine Co., Lufkin, Tex., died Aug. 1, following 35 years with the company.

* * *

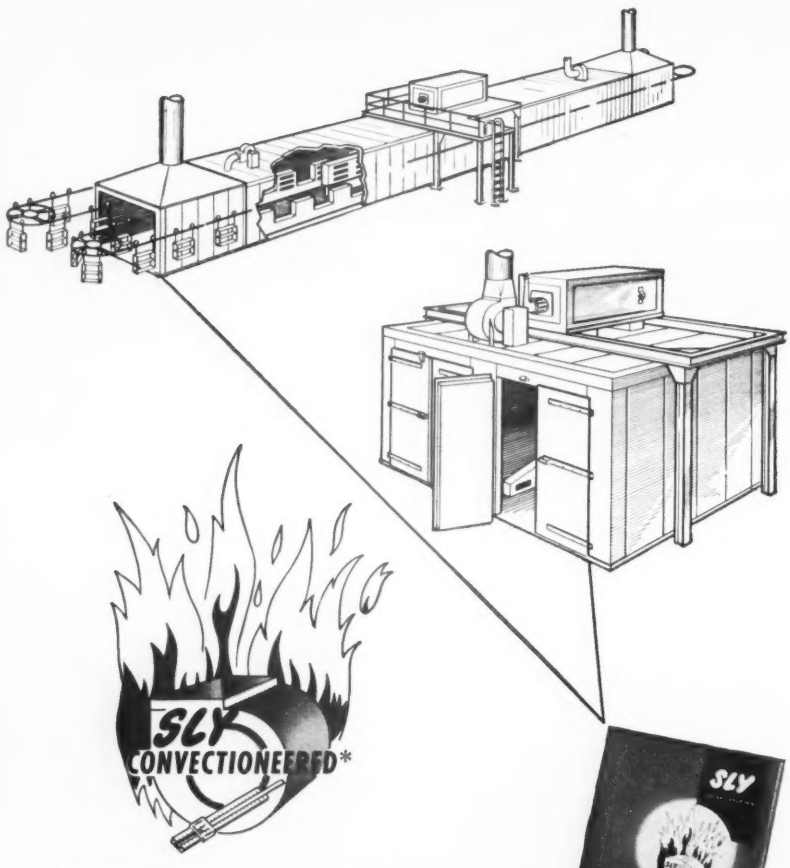
Ralph J. Fox, 54, treasurer, Dayton Malleable Iron Co., Dayton, O., died recently.

* * *

Leland S. Hannold, sales manager, Royersford Foundry & Machine Co., Royersford, Pa., died July 2.

SLY INDUSTRIAL • OVENS

SERVING • INDUSTRY • SINCE • 1874



The solutions to your Industrial Oven and process heating problems can be found in this bulletin.

Your inquiries are solicited whether your requirements are for simple ovens or large complicated continuous systems.

For your copy of Bulletin 200 write or call.

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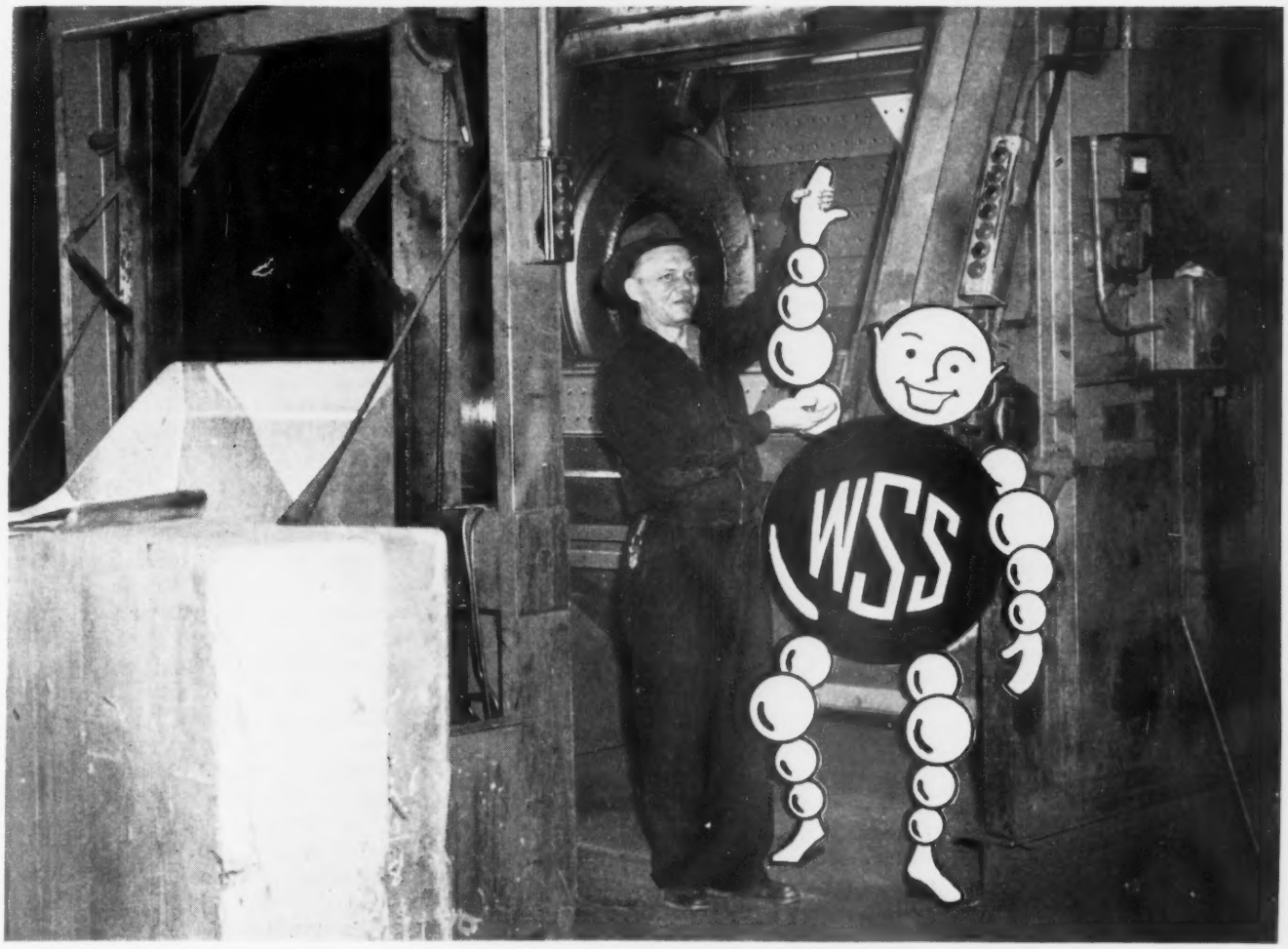
pioneering developments keep **WHEELABRATOR® STEEL SHOT** *first in abrasives*



The Winner . . and New Champion, Wheelabrator® Steel Shot

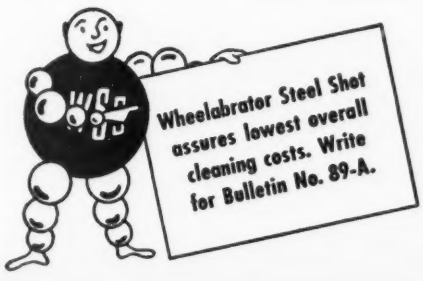
Scores Easy Victory in Blast Cleaning Performance at Swayne, Robinson & Co.

Scoring a 56.6% decrease in blast cleaning abrasive costs, Wheelabrator Steel Shot proved its superiority over a malleable iron abrasive at Swayne, Robinson & Co., Richmond, Indiana in cleaning gray iron castings. As a result of the cost-slashing performance of this superior electric furnace steel shot, an abrasive saving of 86.8c was effected in cleaning every ton of castings.

These additional benefits further established Wheelabrator Steel Shot as the abrasive champion at Swayne, Robinson & Co. With its faster cleaning action, a reduction of three hours daily in the use of their Wheelabrator Tumblast was possible. Casting tonnage which had formerly required seven hours cleaning time is now Wheelabrated in just four hours.

Maintenance labor and machine wear were reduced, effecting additional savings. Quality of cleaning was greatly improved making possible the elimination of tumbling mills formerly used for desired surface appearance of certain types of castings.

Results like these can be duplicated in your cleaning room, too. Wheelabrator Steel Shot is produced under the most rigid controls to provide a metallurgically superior steel shot of uniform quality for the maximum economy in blast cleaning. It will clean faster at lower cost than any other abrasive. Try it and prove it for yourself.



American
WHEELABRATOR & EQUIPMENT CORP.
505 S. Byrkit St., Mishawaka, Indiana

WHEELABRATOR STEEL SHOT

INDUSTRY BRIEFS

FALL RIVER FOUNDRY CO., Fall River, Wis., will begin operations about Sept. 1. The new brass foundry is 150 x 200 ft and is semiautomatic in operation. M. E. Hartz will be the plant manager of the new plant, which will employ about 80 persons. The foundry is a wholly-owned subsidiary of the Badger Meter Mfg. Co., Milwaukee.

* * *

Marion Power Shovel Co., Marion, O., has acquired controlling interest in the Osgood Co., that city. The latter embraces the General Excavator Co. and the Commercial Steel Casting Co. which have been operating as Osgood subsidiaries. John P. Courtright is president and general manager of both companies.

* * *

Rajac Sales Equipment Corp. Inc., 4718 West Tonghy Ave., Lincolnwood, Ill., has been appointed exclusive sales representative for the pneumatic pipeline conveyor system for moving foundry sand manufactured by Gerwin Industries Inc., 214 Spring St., Michigan City, Ind.

* * *

Haas Foundry Co., 1530 Junction Ave., Racine, Wis., has been purchased by the Iroquois Foundry Co., also of Racine.

* * *

Gardner-Denver Co., Quincy, Ill., distributor of compressors, pumps and pneumatic products, has moved into new quarters in Kansas City, Mo., at 309 West 79th Terrace. Office will serve six state area of Missouri, Kansas, Nebraska, Iowa, Arkansas, and Oklahoma. M. G. Handly is district manager and E. L. McMullen is office manager. H. H. Combs and O. L. Wester are field engineers.

* * *

Pulaski Foundry & Machine Shop, General Chemical Division, Allied Chemical & Dye Corp., Pulaski, Va., ceased operations permanently at the end of August because changed processing requirements no longer could be produced by the foundry. The machine shop will cease operations at the end of September. General Chemical Division's Pulaski Works will continue in production.

* * *

Clark Equipment Co., Battle Creek, Mich., has appointed Highway Machinery & Supply Co. Inc., 1724 Altamont Ave., Richmond, Va., as sales and service representatives for Clark's Industrial Truck Division in Virginia. Harry L. Teal, president, and George Cole Scott, vice president and sales manager, are partners in the dealership.

* * *

Mid-Island Non-Ferrous Foundry Corp., Box 138, Farmingdale, N. Y., has been incorporated. Directors are Gertrude and Kirk Moxim, North Lindenhurst, N. Y. and John J. Randall III, Freeport, N. Y.

* * *

Semet-Solvay Division, Allied Chemical & Dye Corp., 400 Rector St., New York 6, has appointed as its sales agent Wilson & Geo. Meyer & Co. The new agent will serve industrial coke customers in the western United States and in the province of British Columbia, Canada. The main offices of Wilson & Geo. Meyer are in San Francisco.

* * *

General Smelting Co., 2901 East Westmoreland St., Philadelphia 34, has been appointed a distributor of Kaiser aluminum ingot and will service foundries east of Pittsburgh, including those in New York, New Jersey, Maryland, Pennsylvania and the New England states.

* * *

Republic Steel Corp., Cleveland 27, has appointed the Hohl Industrial Sales Co., 2603 Main St., Buffalo 14, as sales and distribution agents for its line of materials handling equipment that includes pallets, skids, boxes, and a collapsible steel box and skid unit for shipping.

* * *

Mechanical Handling Systems Inc., Detroit, manufacturer of materials handling equipment, has opened an office to serve the Southeast. John W. Lay Jr. is in charge of the office located at 104 Fairview Bldg., 403 West Place de Leon Ave., Decatur, Ga.

* * *

Vulcan Foundry Co., Oakland, Calif., has started production of nodular iron castings, employing the process developed recently by the Meehanite Metal Corp. The first foundry to install this process, Vulcan also continues to produce its regular line of Meehanite castings.

* * *

Wellcast Inc., 3-17 26th Ave., Long Island City, N. Y., foundry and machine shop, has been incorporated, listing capital stock of 200 shares, no par value. Filer of papers was Schulman, Giaccone, Dorn & Marcus, 150 Broadway, New York.

* * *

Beloit Castings Co., Beloit, Wis., has won recognition for achieving a superior safety record. Superintendent Elmer Bertram was presented an engraved plaque by J. D. Meeley, safety engineer for Employers Mutuals of Wassau.

* * *

Moore Bros. Co., 47 Bond St., Elizabeth, N. J., has ceased foundry operations and is offering its supplies and equipment for sale.

* * *

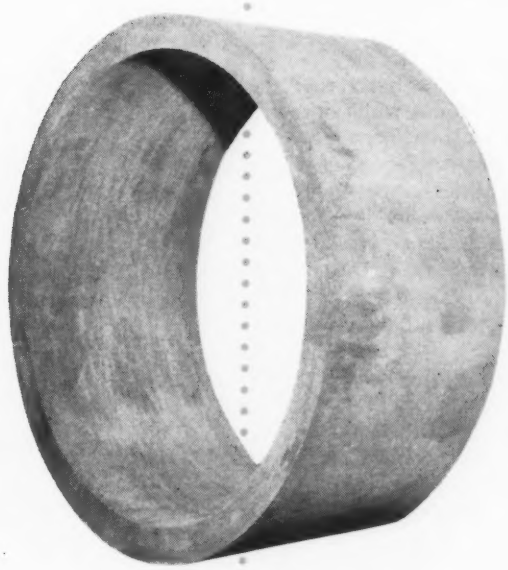
Clark Equipment Co., has appointed the George Industrial Equipment Co., 11th Ave. at 50th St., New York,

(*Concluded on page* 197)

FIRST NATIONAL SALES MEETING: The Grindle Corp., Harvey, Ill., manufacturers of cupolas and accessories, recently held its first national sales meeting. The company, founded a little over two years ago, now has the following sales representatives: W. Thomas Barr Associates, Birmingham; M. A. Bell Co., St. Louis; Davis-Gregg Co., Los Angeles; Eastern Foundry Supplies Inc., Newark, N. J.; Foundry Supply Co. Inc., Minneapolis; Walter Gerlinger Inc., Milwaukee; Hollins Foundry Equipment Co., Chicago; Industrial Foundry Supply Co., San Francisco; Dick Jacobs Co., Detroit; W. A. Miner Associates, Chicago; Wm. E. Mollenauer & Co., New York; Walter Mueller Co., Philadelphia; Pennsylvania Foundry Supply & Sand Co., Philadelphia; Pittsburgh Alloy Co., Pittsburgh; Wark Foundry Equipment Co., Kenmore, N. Y.; Western Foundry Sand Co., Seattle; Western Industrial Supply Co., Portland, Oreg., and F. J. Wurscher, Marion, Ind.

LININGS FOR NONFERROUS CRUCIBLE FURNACES

THIS RING:
70 LBS.
18" I.D.
21" O.D.
8" HIGH



For speed and ease of installation—and low melting costs—you can't beat this lining. It consists of one-piece rings that are set by hand, and a back-up cement that you just mix with water and pour. A complete lining takes only 1½ hours to install. No hoists are needed, and a minimum of manpower.

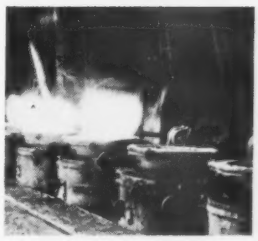
But most important, once in, you have the most nearly indestructible lining known. The rings are silicon carbide, and the castable cement is aluminum oxide bubbles. The rings act as a thin "armor plate" facing. Being only 1½" thick, there's more room for the cement—gives you more insulation. This combination *lasts 1½ to 2 years,* and frequently longer.

It also makes your furnaces work better. They heat faster. Usually use considerably less fuel per pound of metal melted. And it's not uncommon to get one or two extra heats per furnace per day!

WHY NOT CHECK UP? We make lining materials to fit every need—rings, ring segments, and cements. Let us help you get the most from *your* refractories.

No hoist needed to install

1½ hours start to finish



lasts 2 years or more

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Registered Trade Mark
Dept. A-94, Refractories Div., Perth Amboy, N. J.

Make Their Own Foundry Patterns

FASTER—AT FAR LOWER COST

with Rockwell-built

DELTA POWER TOOLS

"With DELTA Power Tools, we're able to make our own patterns faster, and for less money, than by buying them on the outside," reports J. R. Wallace, pattern shop supervisor at Edward Valves, Inc., East Chicago, Indiana.

"DELTA Tools have helped tremendously in reducing our pattern cost. Their accuracy and flexibility have enabled us to meet production deadlines while holding tolerances as close as 1/64th of an inch."

"Delta's low price makes it possible for us to speed our work by purchasing two Deltas, rather than one large, expensive machine. . . . And there's practically no maintenance. These rugged machines never get out of alignment. As far as we're concerned, DELTA is the best industrial tool made." Of the 10 Delta-built tools in Edward Valves' pattern shop, several have been in daily use for more than 30 years!

Edward Valves is only one of hundreds of foundries cutting costs and improving production with DELTA Power Tools—not only in pattern making, but in finishing operations, too. For instance, DELTA Metal-Cutting Band Saws, Cut-off Machines, and Abrasive Finishing Machines provide unusual efficiency in casting header removal, deburring, and surface finishing.

Delta Power Tools can help YOU cut costs and improve production. Talk to your Delta Dealer today, he's listed in your telephone book under "Tools" or "Machinery," or send the coupon for complete catalog information.

This 20" band saw is one of ten Delta Tools in the pattern shop of Edward Valves, Inc. Operator N. H. Luecke is shown cutting out a small piece for a new valve pattern.

Operator Leroy Schmidt uses DELTA 12" Tilting Blade Saw to speed precision woodworking in the pattern shop at Edward Valves, Inc., which is equipped with 10 Delta-built tools.

Pattern maker drills the core box of a 10" piston pattern on a DELTA 17" Drill Press at Edward Valves, Inc. Tolerances are often held to 1/64".

DELTA QUALITY POWER TOOLS
Another Product by **Rockwell**

DELTA MILWAUKEE

DELTA QUALITY MAKES THE DIFFERENCE

Delta Power Tool Div., Rockwell Manufacturing Co.
706J North Lexington Avenue, Pittsburgh 8, Pa.

☐ Please send DELTA AB-53 catalog.

☐ Please send name of my nearest DELTA Dealer.

Name_____

Address_____

City_____ Zone_____ State_____

(*Concluded from page* 194)

as sole distributor in the greater New York area of Clark's line of fork lift trucks and other materials handling equipment.

* * *

An estimated $25,000 damage resulted from a fire at the Washington-Fillmore Foundry Inc., 153 Fillmore Ave., Buffalo 10, on July 16. Damage was confined principally to three cupolas, and to wood patterns and flasks.

* * *

C. O. Bartlett & Snow Co., 6200 Harvard Ave., Cleveland 5, manufacturer of materials handling equipment, will enlarge its plant by about 20 per cent, bringing total factory area up to 50,000 sq ft. The addition will be completed late this year.

* * *

Solon Foundry Inc., Solon, O., is building an 80 x 120 ft foundry building to house facilities for the production of aluminum and magnesium precision sand castings by the Osbrink process. Initial production is expected early next year.

* * *

Republic Steel Corp., Cleveland, has appointed P. W. Voss & Associates, 918 South Michigan Ave., Chicago 5, to handle the sales and distribution of materials handling equipment made by Republic's Pressed Steel Division in Cleveland.

* * *

Howard Foundry Co., Chicago, has formed a new subsidiary, Howard Electric Co., which will manufacture an electrical underfloor system for office and industrial buildings. Plant and general offices are at 1700 North Kostner Ave., Chicago.

* * *

General Electric Co., has opened a $5 million manufacturing plant at Bloomington, Ill., to manufacture a complete line of electric controls for industrial use, including starters for motors, push buttons and compensators.

* * *

Lewis-Shepard Products Inc., Watertown, Mass., has appointed Upton Bradeen & James Ltd., 890 Yonge St., Toronto, Ont., Canada, as its exclusive sales and service representative in Ontario. The firm has branches in Hamilton and Windsor.

* * *

Bellows Co., Akron, has established a sales office at 330 Municipal Court Bldg., Ann Arbor, Mich. Daniel J. Gurta will be the field engineer in charge.

* * *

International Minerals & Chemical Corp., Chicago, has purchased the Sonsel Refractories Co., Brighton, Mich., from the National Foundry Sand Co., Detroit. All aspects of the Sonsel firm, including patents and process, have been acquired by International. The National Foundry Sand Co. will continue to sell in the midwestern states and the province of Ontario, Canada, the special refractories formerly produced by the Sonsel company.

* * *

Acheson Colloids Co., division of Acheson Industries Inc., Port Huron, Mich. has opened a Rochester sales headquarters serving western New York and western Pennsylvania. Territorial sales supervisor is E. A. Lampman, service engineer.

* * *

New Process Metals Inc. has opened a new enlarged plant at 45-65 Manufacturers Place, Newark, N. J. The company specializes in the manufacture of cerium (misch) metal and other rare earth metal alloys.

* * *

Mechanical Handling Systems Inc., Detroit, has opened a New York district office at 39 Park Place, Englewood, N. J. William H. Maute is manager of the new office.

IFMA Makes Plans for Metals Congress

Following its 25th annual meeting at the Homestead, Hot Springs, Va., May 16-19, the Industrial Furnace Manufacturers Association has announced sponsorship of three half days of practical industrial heating sessions at the National Metals Congress and Exposition in Chicago, Nov. 2-3.

On Tuesday, Nov. 2, there will be morning and afternoon sessions on atmospheres with speakers from IFMA member companies covering both theory and furnace applications, including case examples. On Wednesday afternoon, November 3, IFMA member speakers will cover the theory and practice of induction and dielectric heating. Selection of speakers will be under the supervision of the IFMA Public Relations Committee, of which C. H. Stevenson, vice president, Lindberg Engineering Co., is chairman.

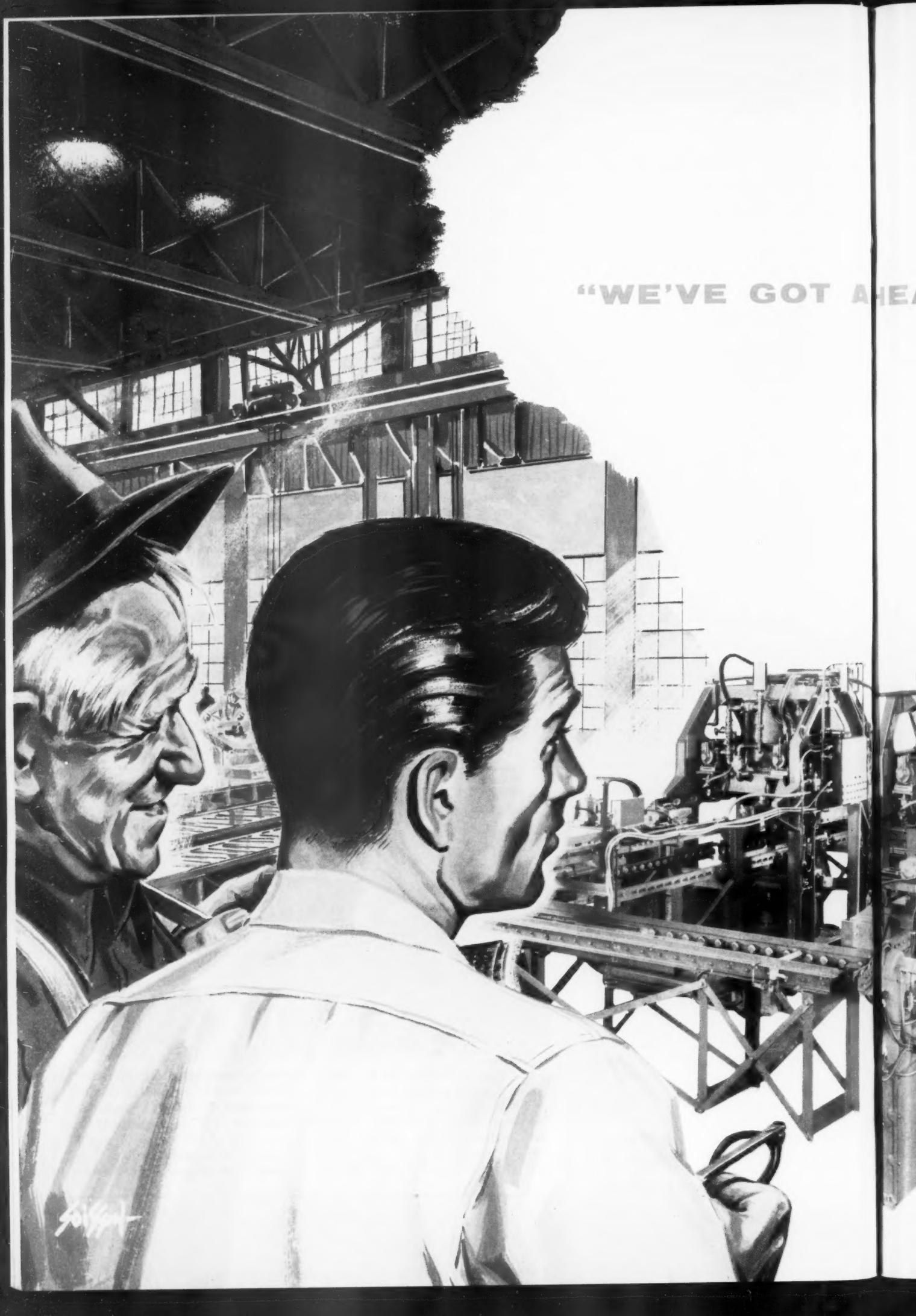
The IFMA also has published recently its 1954 directory of officers and directors, committees, by-laws, and roster of member companies.

AMA Issues Booklets

Latest additions to the Manufacturing Series of booklets issued by the American Management Association are No's. 211 and 212. Booklet 211, "Production Guides and Controls for the Modern Executive," contains five papers on planning in a manufacturing enterprise, meeting "hard-sell" times, uses and basic concepts of operations, research, predetermined time and motion methods and theory and practice of work sampling. Booklet 212, "Gearing Up for Better Production," is in the format of an eight-man panel discussion of the organizational and interdepartmental aspects of the manufacturing job.

Copies are available for $1.25 each to nonmembers and $1.00 each to members of the association, 330 West 42nd St., New York 18.

SCOUTING AROUND THE FOUNDRY: Under sponsorship of Albion Malleable Iron Co., Albion, Mich., Albion Explorer Post 58 put on a foundry practice demonstration recently at a Land O'Lakes Council "Scoutorama." The view above, taken from the rear of the Post 58-AMICO booth, shows many exhibits on the tables. Visible are a mold, a 105-mm shell, a pattern for rocker arms, a sand core and various automotive castings. At the left, two scouts explain the casting process to a group of onlookers


"WE'VE GOT

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A recent survey showed that many large jobbing and production foundries are being caught in "the middle." They are trying to meet stiffer competitive prices while operating antiquated inefficient equipment. With fully automatic molding machines making even "new" standard equipment obsolete almost overnight, survival will depend more than ever on the ability to produce more for less.

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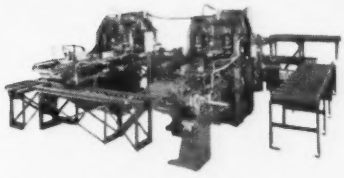
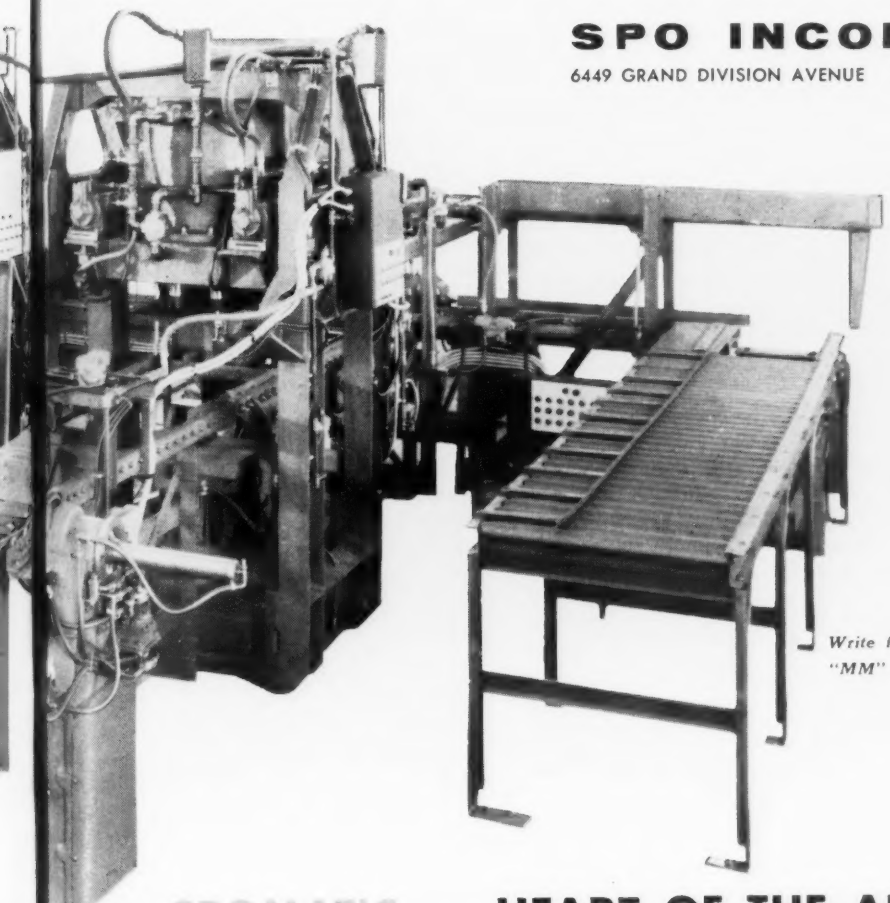


The SPOMATIC provides the most economical, high-speed, efficient means of automatic production molding available today. Operating with minimum supervision and effort, it will outproduce any other molding equipment. The SPOMATIC molds copes and drags simultaneously. Once it is started, all operations are fully automatic, mechanical and continuous.

The SPOMATIC will give you an edge on competition . . . permit tremendous savings that will amortize initial costs quickly . . . and will keep your production jobs profitable.

SPOMATIC installations are engineered to individual foundry requirements. SPO engineers will be glad to discuss your needs . . . to give you a head start on tomorrow today!



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SPOMATIC . . . HEART OF THE AUTOMATIC FOUNDRY

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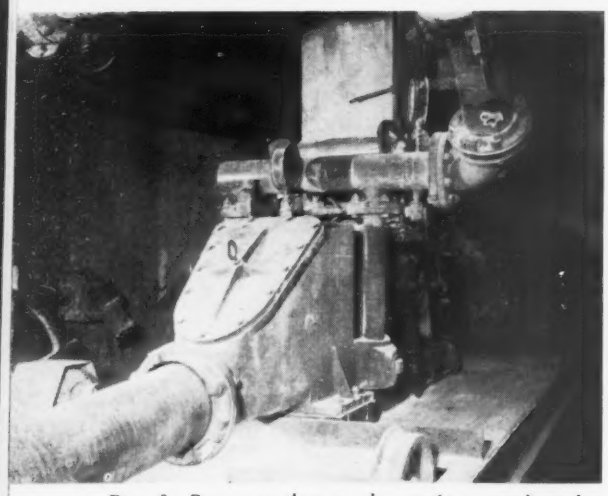


Fig. 1—Pump under track grating receives incoming materials, sends them to receiving bins

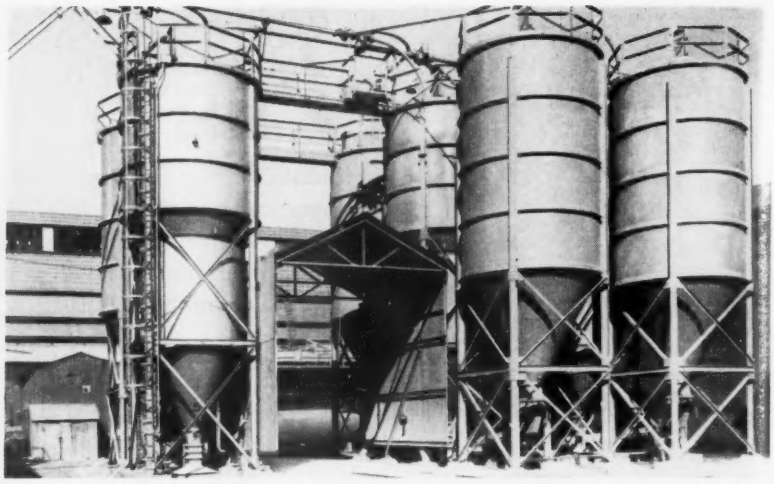


Fig. 2—Bulk carloads of flour and bentonite are spotted in shed and discharge through track grating to conveying system

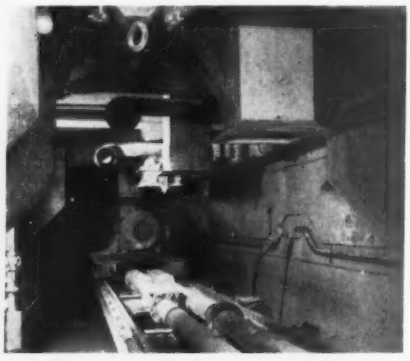


Fig. 3—Second pump delivers materials from storage to bins

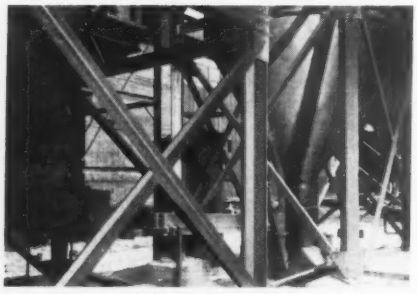


Fig. 4—Conveyors are used to supplement pumps where needed

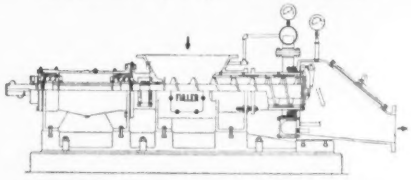


Fig. 5—A pump moves materials from hopper to mixing chamber

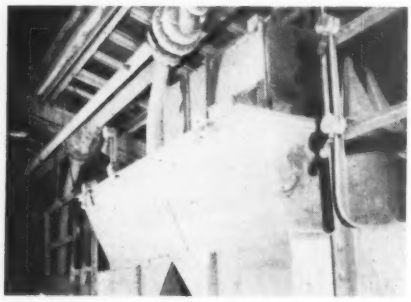


Fig. 6—Conveyors and two-way valves divert material to bins

PNEUMATIC SYSTEM

Handles Sand Ingredients

GENERAL Steel Castings Corp., Granite City, Ill., receives corn flour, silica flour and bentonite in bulk and delivers these materials from freight car to storage and from storage to process by a pneumatic conveying system which includes conveyors, pumps and valves. These ingredients are mixed with core and mold sand to give desired sand characteristics.

Formerly, these materials were received in bags and were manually unloaded, stored and transported to mixers. The Fuller-Kinyon pneumatic handling system not only eliminates these manual operations, but also speeds car unloading and delivery to mixers. In addition, it does away with dusty working conditions, releases bag-storage space for other uses and virtually eliminates a rodent nuisance. Of prime importance is the fact that cost of materials purchased in bulk is considerably less than that of materials purchased in bags. Waste of material due to breakage of bags and to windage is eliminated, too.

An over-all view of the unloading and storage facilities is shown in Fig. 2.

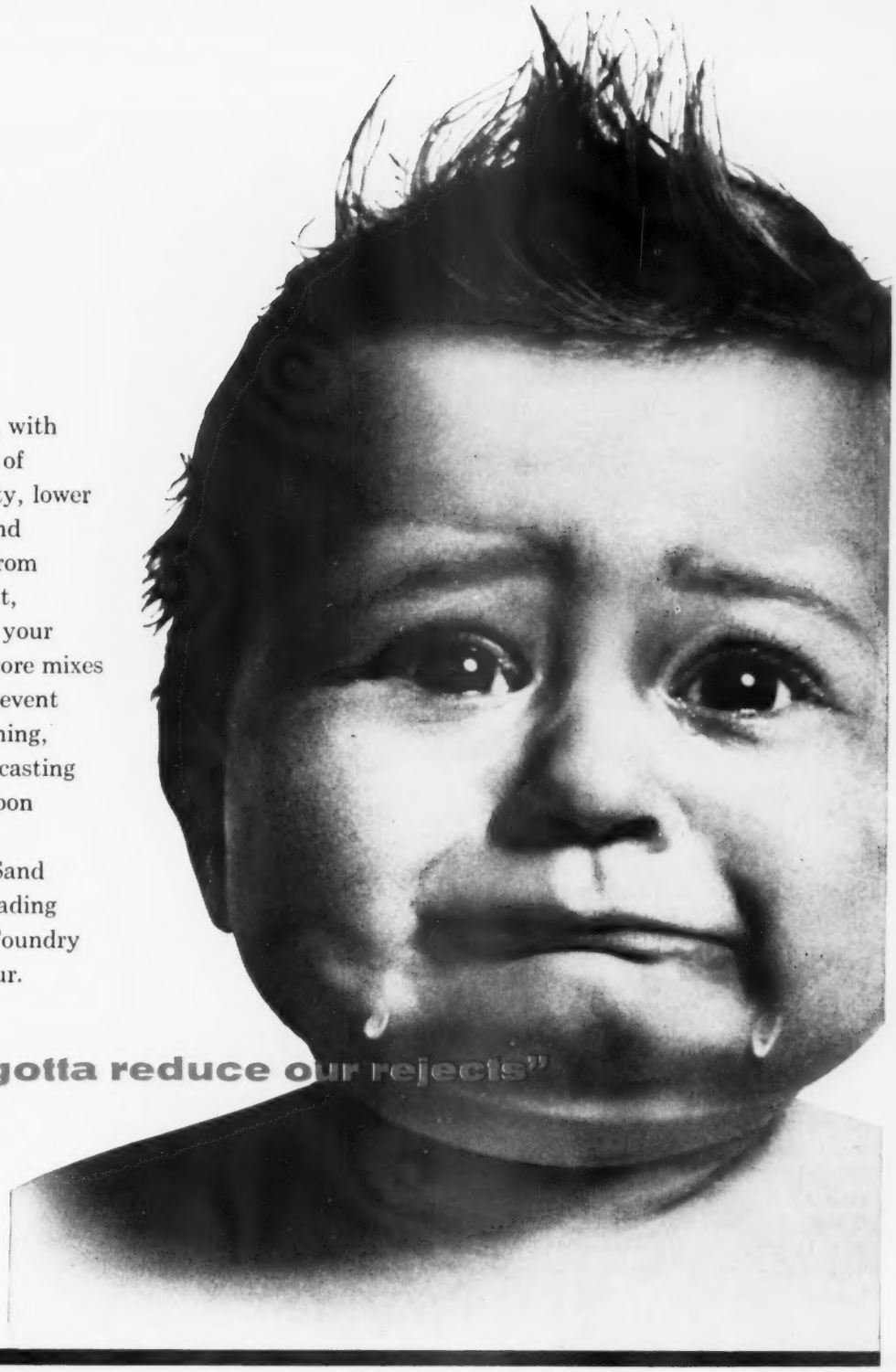
Two portable pumps, located in an underground tunnel, are used in this installation. The pumps are mounted on trucks which run on a narrow-gage track for easy positioning beneath hopper-bottom cars or storage bins. One (Fig. 1) is used mainly for unloading cars and delivering to storage and the other (Fig. 3) for reclaiming from storage and delivering to supply bins above mixers (Fig. 4). Both pumps, however, can be used for reclaiming from storage, if desired. Also, it is possible to unload from cars and reclaim from storage simultaneously.

The pump (Fig. 5) is comprised of a screw element which advances the material into a mixing chamber, in which it is made fluent by compressed air. From the mixing chamber, air at 15 psi discharges the material to an air line for delivery to eight storage bins. Each holds about 30 tons of material; two are for silica flour, two for corn flour, and four for bentonite.

Where bins are located so that they cannot discharge directly into a pump, conveyors bridge the gap. Material from such bins discharges through a rotary valve to one type of conveyor, then to another (Fig. 6) and to the pump.

The first conveyor is located directly beneath the rotary valve. Compressed air at 3 psi is introduced into it and circulates upward into the bin, aerating the material and helping to prevent arching and hang-up.

The second conveyor is rectangular in cross-section and is divided horizontally by a porous fabric. Air, at 15 in. of water-gage pressure, is introduced into the lower section and passes through the fabric, fluidizing the material above and causing it to flow by gravity to the pump. A weir separates the two conveyor pressure areas.



You can, young man, with Penn-Sand! Because of its higher permeability, lower confined expansion and perfect uniformity from shipment to shipment, Penn-Sand simplifies your control of mold and core mixes and thus helps to prevent rat-tails, buckles, veining, scabbing and other casting defects. Clip the coupon and mail it today to Pennsylvania Glass Sand Corp., the nation's leading producer of Quality Foundry Sands and Silica Flour.

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TROUBLE SHOOTING

By C. W. AMMEN

Preparation of Synthetic Sand

Synthetic sand is neither synthetic nor mysterious. It consists of a weak, fine, dry sand to which various ingredients are added to produce properties the foundry desires in the mixture after it has been mulled

Dear Charlie:

How's about synthetic sand for nonferrous work? There's a lot of sand in my area, clean sharp silica of various fineness, and some very weak bank sands, but there are no natural bonded sands suitable for molding. The local sands of which I talk are very cheap and can be had in truck-load lots as needed. The absence of suitable natural bonded sands in this area requires us to get a price, to buy in car lots and to store sand, and 50 per cent of the cost is freight charges.

I have been told that synthetic sands are not recommended for nonferrous work and that a fellow has to be a regular professor to handle it—also that for jobbing work and loose pattern work, it dries out too fast. I have a book put out by one of the bentonite vendors which gives sand mixes for steel, gray iron and malleable, but the section on nonferrous sands relates only to rebonding spent natural bonded sand. Are the mixes given under gray iron suitable for aluminum and brass, say using a finer sand? I have been told we need a muller for this type of work. This we have, but we have no elaborate sand lab testing equipment. What is the minimum equipment that we can get away with?

Sam

Dear Sam:

Well, Sam, there is no mystery to synthetic sands whatsoever. The word synthetic is erroneous and misleading. Synthetic sand is not synthetic in any way. It is basically a combination of natural materials provided by Mother Nature, mixed in proportions desired to give certain properties wanted by the user. Natural bonded sand is mixed by Mother Nature and comes as is.

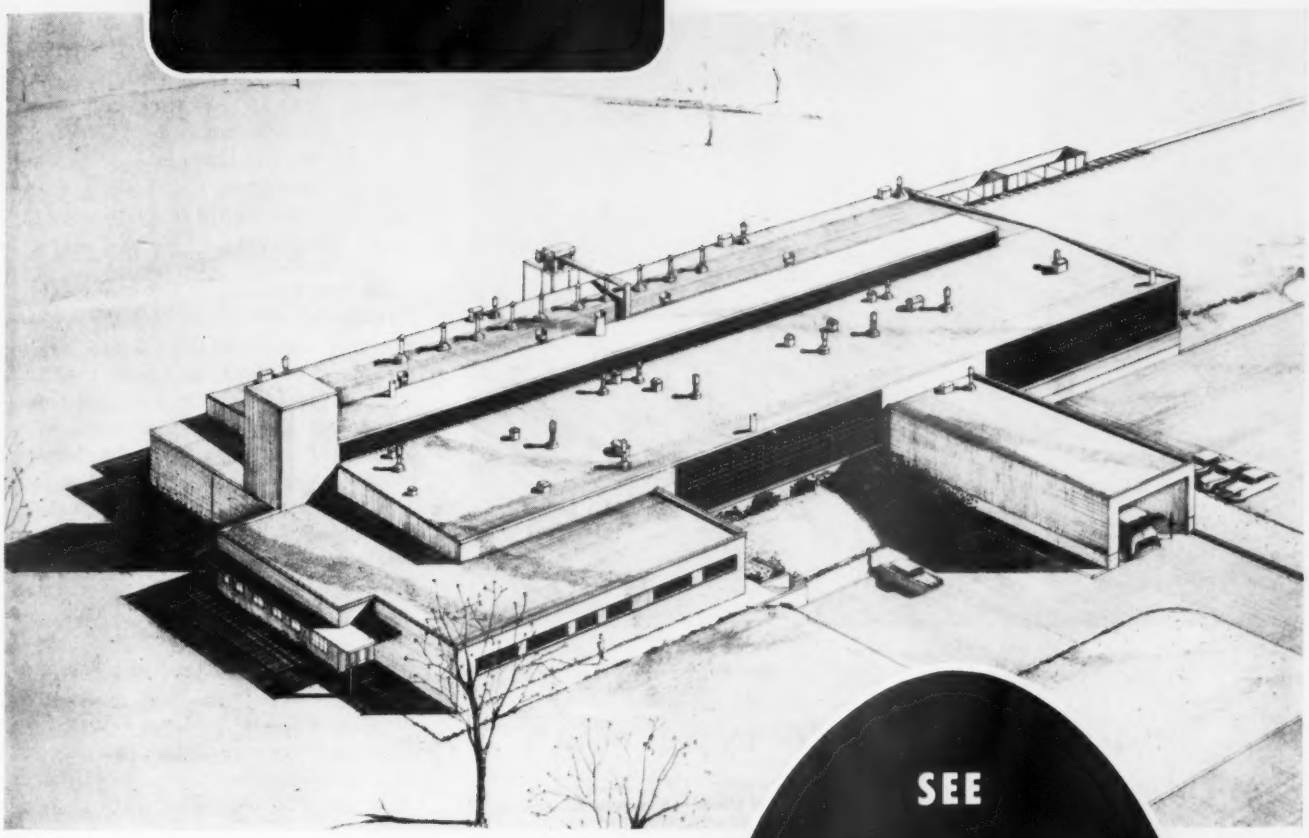
Let's look this synthetic sand business right in the teeth for what it is. Don't start out under the illusion that it is the answer to all your problems and will produce miracles of some sort. It is in reality a very simple and effective sand mixture which when properly prepared and used will give good results. In general it requires no more equipment to test than you should have and use with your natural bonded sand. It does, however, require a muller or paddle mill to give the correct results. The muller is preferred and is the heart of the system. It is necessary in bonding new and used synthetic sand, which requires a kneading and plowing action to develop its properties fully in the shortest time and to produce uniform sand, batch after batch. Also, the muller develops green strength well.

Much work has been done on the use of synthetic sand in nonferrous work. Your remark about needing to be a professor reminds me of a southern brass shop, run and owned by an old boy who would turn purple at the mere mention of anything synthetic, sand or otherwise. The shop was within a stone's throw of the Red River, and it did jobbing in brass and aluminum that ranged from a few ounces to about 50 lb, using a closely guarded secret sand. He was taking a low-clay, silty sand from the banks of the Red River, dumping it into an ancient muller, adding bentonite, which he mulled for a few minutes, then adding water until the mix felt strong enough to mold. If it felt too weak, he simply threw in another shovelful of bentonite until it felt O.K. by the old squeeze and break test. He rebonded floor sand and used sand, also by feel, adding bentonite only if it felt too weak in the mill. He added moisture a little at a time until the sand felt wet enough and watched how it fell in front of the plows and squeezed from under the muller wheels. At this point he would add, if needed, some bentonite to bring up the strength. Batches were approximately 1500 lb.

On loose work he added 2 qt of used crank case oil from a nearby filling station to keep sand from drying out too fast. Every now and then he added new sand when the mix felt too fine. On heavy jobs he would add cereal and pitch and skin dry. When asked about his sand, he would state that it was mixed by a formula handed down from the ancient pharcahs of Egypt and was closely guarded at all times. A sample spirited away by the light of the moon showed the following: A 3-screen sand, fineness 170, 1 per cent clay, as a base sand. The sys-

(*Continued on page* 204)

Badger Meter Mfg. Company
Fall River Foundry
Fall River, Wisconsin



The many features contributing to the layout and design of this new brass foundry were accomplished through the combined efforts of the owner's representatives and the foundry engineers of Giffels & Vallet, Inc.

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WHAT *They* SAY
ABOUT
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This new MOCO Oven is perfect for baking, heating, drying, and curing. It is specially designed and engineered to include many of the features made famous in MOCO's custom-built ovens.

All these features are included in one amazingly low price:

- Operating Temperatures up to 500° F.
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MICHIGAN OVEN COMPANY DETROIT MICHIGAN MOCO

The model shown has a work chamber 4 ft. wide by 4 ft. deep by 6 ft. high and is gas operated. Other Standard sizes are available. For further information, write for this comprehensive folder today.

MICHIGAN OVEN COMPANY

419 BRAINARD · DETROIT 1, MICHIGAN

(*Continued from page* 202)

tem sand showed 4 per cent moisture; permeability 25, green compression, 7.5 psi. Bentonite content was about 4.5 per cent. He had been using this system for some time without any testing equipment whatsoever, using only a close watch on results and squeeze and break testing. Take it from me, his work was comparable to any I have seen. The old boy was not a professor, but had a well trained eye and touch. He confided in me one day, quote: "Kid, there's something in this Red River sand that does the trick, Lord only knows what." Knowing his fiery dislike for synthetic sand, I never told him what I thought. And, after a short stay with him, I took the side-door Pullman for points north.

Tried the Same System

Some years and many shops later, I tried his no-system system. With a small 400-lb muller, I ran for a period of 90 days, using no measuring equipment, mixing new sand and rebonding old sand by feel only, adding moisture by feel and by observation as to how it mulled and testing green strength by squeeze and break. The sand was a dune sand taken from the Mojave Desert, selected by feel. No attempt was made to classify the sand, and no screens were run on it. I just hauled it in and bonded it up. A plate with a step wedge from 1 to ⅛ in. and a ¾ gas cock pattern were used. Fifty molds were made per day by the same molder. No mold hardness or pouring temperature tests were taken. The whole experiment was done entirely by feel. Resulting castings were 450 gas cocks and 450 wedges. I lost three gas cocks (one crush, one misrun, one dirty) and one wedge (crush).

No, don't get me wrong: I do not recommend this practice.

Good results can be had, however, with a minimum amount of equipment for mixing and testing and without getting into an elaborate control system requiring additional personnel, etc. Minimum equipment includes a muller, with aerator; a green compression tester (spring compression type); a standard sand rammer (with tube to produce a 2-in. AFS specimen); a permeability meter; a moisture teller; a mold hardness gage; and an AFS *Foundry Sand Handbook*. This equipment can be located through the Where-to-Buy pages of FOUNDRY.

You should have the sand testing equipment listed herein, whether your work is with synthetic or natural bonded sand. Remember, sand

control is the most effective tool you can use to reduce losses and to produce top quality work. Without it you cannot produce consistent results. The lack of sand control by routine testing explains why sand is allowed to become unsatisfactory and difficult to revive, until in extreme cases it must be replaced altogether. It is amazing how many shops, in the face of increasing competition and new methods, give little attention to the very material with which they mold. Even 10 per cent of control added to your sand preparation will produce amazing results.

Sam, in selecting the base sand, the best rule-of-thumb system is to use the weakest, driest, finest sand you can obtain which will give you the best castings. This can be found only by actual practice.

Popular Sand Mixtures

The following are four of the most popular synthetic sands in use today in nonferrous shops: 1. Aluminum and brass—Penn wash float silica, AFS fineness 160; southern bentonite, 4 per cent by weight; hardwood flour, 200 mesh, 1 to 1.5 per cent. 2. Semisynthetic, brass and aluminum—60 per cent washed and dried silica, AFS fineness 120, and 40 per cent natural bonded sand, Albany "O"; sufficient southern bentonite to give the desired green strength (7 to 8 psi); hardwood flour, 200 mesh, 1 per cent. 3. Brass—Washed and dried silica, AFS fineness 120; southern bentonite, 4 per cent by weight; hardwood flour, 1 to 1.5 per cent. 4. Copper—Washed and dried silica, AFS fineness 130; southern bentonite, 4 to 4.5 per cent by weight; hardwood flour, 1 to 1.5 per cent; silica flour sufficient to drop permeability to between 40 and 50 if needed.

Held to within reasonable limits of the following values, sands 1, 3 and 4 in general will give a high percentage of good results. Mix No. 1: Permeability, 8 to 16; moisture, 3 to 5 per cent, as low as possible; green compression, 7 to 8 psi; AFS fineness, 200 to 160. Mix No. 3. Permeability, 12 to 20; moisture, 3 to 5 per cent, as low as possible; green compression, 7 to 8 psi; AFS fineness, 160 to 120. Mix No. 4: Permeability, 35 to 50; moisture, 3 to 5 per cent, as low as possible; green compression, 7 to 8 psi. Mix No. 2 carries about 6 to 7 per cent moisture.

For heavy brass and aluminum, vary your sand accordingly, for high permeability, use a coarser sand and hold your moisture as low as pos-

Produce cleaner forgings

... with ladle linings made of

J-M 3X Blazecrete® — the hydraulic setting refractory

J-M 3X Blazecrete makes possible cleaner forgings because it has great ability to resist penetration and attack by molten metal.

3X Blazecrete . . . the 3000F refractory . . . is easily and quickly applied . . . mix with water like ordinary concrete, and slap-trowel to desired thickness. Hardens without application of heat. Contains no harmful irritants . . . safe even for hand application. 3X Blazecrete is furnished as a dry mix, and may be stored indefinitely without deterioration.

Longer lasting linings can be built with 3X Blazecrete because it is spall-resistant, withstands slagging action and has negligible shrinkage.

Send for free brochure on Blazecrete (RC-28A) describing its properties and uses. To obtain your copy—as well as additional application details—write Johns-Manville, Box 60, New York 16, N. Y. In Canada, 199 Bay Street, Toronto 1, Ontario.

Whether you gun it... *or slap-trowel it...*

JOHNS-MANVILLE JM PRODUCTS

Johns-Manville BLAZECRETE

BUILDS BETTER REFRACTORY LININGS

sible. Bentonite has its greatest bonding strength with optimum moisture.

It is difficult or even impossible to set down any hard and fast rules. The acid test is in the end results. You are shooting for a sand which will give you sufficient strength, permeability and lowest moisture, yet produce a good finish.

Permeability can be controlled with silica flour, which closes up sand, and with coarse sand, which opens it up, moisture being constant. Bentonite will control the green strength, moisture remaining constant. Wood flour gives a cushion to prevent over-ramming, improves finish, shakeout and collapsibility and provides a reducing atmosphere in the mold cavity. The pickup of core sand and butts will tend to open the sand up, and fines will tend to close it up. The trend will show readily from daily sand tests and casting inspection. For some unknown reason, mix No. 1 is preferred in the eastern and southern sections, and mix No. 3 is coming into wide use along the west coast. Because of their low moisture and high permeability, they can be rammed very hard and will produce castings with a nice peel that are close to size. Either of these sands can be rammed like a brick, sprayed with a suitable binder, such as a lignin sulphite binder and water and skin dried with excellent results on special work. No mention of sintering point is made since most base sands are above 2300°F and are suitable for nonferrous work.

Your core sand or sands should be as close as possible to the same fineness as your selected base sand, so as to have a minimum effect on physical properties as it enters the system. Whether it be washed and dried silica sand, crude silica, lightly bonded sand, beach or lake sand, bank or dune, the base sand should have as wide a grain distribution as possible. Such a distribution will give you your best over-all working conditions.

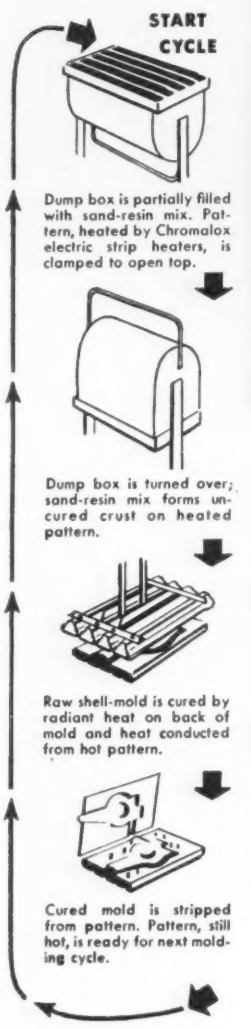
You will find that the permeability and other figures given in the recommended limits for the four mixes are to be used as a guide. Permeability will run higher than the value given due to the low moisture used. The highest permeability possible at which you can get a satisfactory finish is the best point. The wood flour can, if desired, be deleted, but is very beneficial and a most useful tool in control.

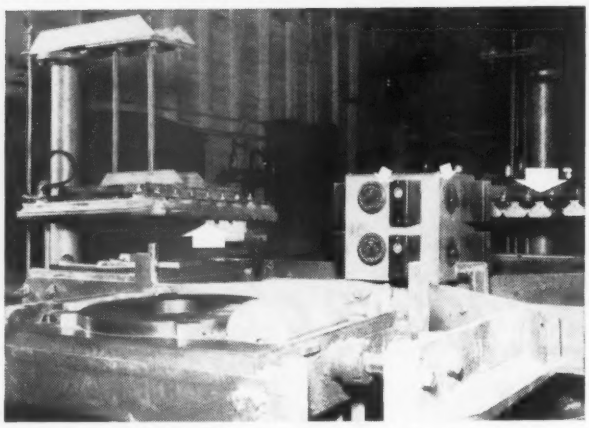
Some foundrymen put in a small percentage of cereal bond with or without the wood flour. This is a matter you must decide for yourself. The sand which produces the best results day in and day out is the best mix for you, regardless of what's in it. As for myself, I think

(*Concluded on page* 208)

Another **CHROMALOX** *Production Tip*

STREAMLINING SHELL MOLDING WITH ELECTRIC HEAT


START CYCLE
Dump box is partially filled with sand-resin mix. Pattern, heated by Chromalox electric strip heaters, is clamped to open top.
Dump box is turned over; sand-resin mix forms uncured crust on heated pattern.
Raw shell-mold is cured by radiant heat on back of mold and heat conducted from hot pattern.
Cured mold is stripped from pattern. Pattern, still hot, is ready for next molding cycle.



Large arrows show Chromalox all-metal Radiant Heaters used to cure shells. Center arrows point to input controllers which dial heat intensities for various mold sizes and shapes.

PROBLEM

To provide: 1—an intense heat to cure the sand-resin mix speedily; 2—uniform heat for even curing; 3—a compact, easily installed heat source.

SOLUTION

Chromalox electric strip heaters were attached to the pattern bottom to heat the mold from the pattern side. Chromalox radiant heaters with variable input controllers were installed at the curing stations to heat the mold from the other side.

ADVANTAGES

The shell molds are heated quickly and uniformly with heat that's applied evenly over entire area. Both strip and radiant heaters are easily installed. Both are of durable, all-metal construction. Heat is put exactly where it's needed in the precise quantities required.

Want to know more about CHROMALOX electric heat?

EDWIN L. WIEGAND COMPANY SB-31
7596 Thomas Blvd., Pittsburgh 8, Pa.
Send me more details on Chromalox Electric Heat for
☐ Shell molding ☐ Core drying
☐ Skin drying of molds ☐ Comfort heating

Name_____
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City_____ Zone_____
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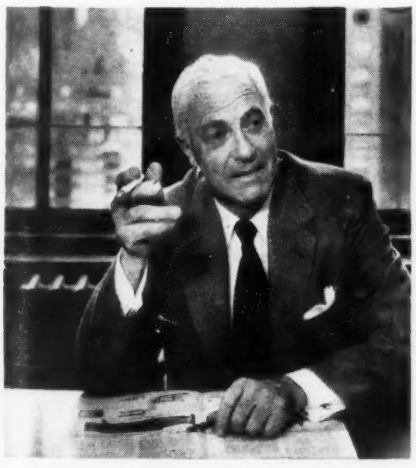
CHROMALOX
Electric Heat for Modern Foundries

"Well, you said dump it where you're standing!"

(Advertisement)

How Do Lightweight Refractories Cut Fuel Costs And Boost Furnace Output?

Here, certainly, is a timely question. There's a heavy squeeze today on most furnace operators for lower costs, larger production . . . or both. And despite all the economies they've put into effect so far, they're still searching hard for ways to make their furnace dollars do a bigger job.



The following discussion brings out a number of facts, often overlooked, about the money-saving, profit-building potentials inherent in *lightweight* insulating firebrick.

Q. *First of all, just what do you mean by "lightweight" insulating firebrick?*

A. Compared with dense, fireclay brick weighing approximately 7½ to 8½ pounds each, insulating firebrick range from about 4½ pounds down to slightly over 1 pound for various temperature requirements.

Q. *What does this light weight have to do with lower production costs?*

A. Briefly, heavy furnace linings waste your fuel dollars two ways:

They soak up and store large quantities of heat which are lost when the furnace is cooled; and they conduct and lose too much heat through the wall.

Lightweight insulating firebrick, on the other hand, contain millions of tiny air cells, heat up and cool quickly, absorbing and storing very little heat. Also, they resist heat flow, keeping it inside the furnace to do productive work.

Q. *I can see why you would save on fuel — but how much?*

A. There's no single answer to that question—there are too many variables to be considered. But to give you an idea of these savings, here are a few actual examples:

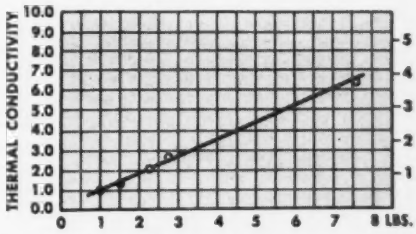
The operator of a large forge furnace cut his fuel costs more than 50% after changing to *lightweight* insulating firebrick.

A manufacturer of electric kilns states that insulating firebrick result in heat savings of fully 25%.

A magnesium melting crucible furnace that formerly used 1,000,000 BTU's per hour now does the same job with 500,000 BTU's, thanks to insulating firebrick.

Q. *Increased production has also been pointed out as an advantage of insulating firebrick. How do you explain this?*

A. Again the answer lies in lightness of weight. Because lightweight firebrick store and conduct less heat, they come up to operating temperature faster — cool down faster, too. This means — shorter heating cycles.



Relation between weight and thermal conductivity for several brands of kaolin base refractories. (mean temperature, 900F)

Secondly, because lightweight firebrick conduct far less heat than heavy, dense firebrick, you don't have to build as thick a wall. This gives you more hearth area per square foot of floor space.

Thirdly, lightweight firebrick respond more rapidly to changes in furnace heat input, which means closer temperature control and fewer rejects in many instances.

It's just like adding extra furnace capacity without adding to your furnace investment.

Q. *Are there any differences in the performance of the various brands of insulating firebrick available?*

A. Naturally, the *lighter* the brick the greater the fuel savings and furnace output. And the lightest insulating firebrick of all, for any temperature range — if you'll pardon our mentioning it — are B&W Insulating Firebrick.

THE BABCOCK & WILCOX CO.
Refractories Division
General Offices:
161 East 42nd St., New York 17, N. Y.
Works: Augusta, Ga. R-508

(*Concluded from page* 206)

a small pinch of Copenhagen is most beneficial.

Daily checks and tests kept in an accurate and systematic manner easily can be correlated with your practice. The correct amounts of binders, wood flour (or what have you) to be added or left out per batch depend entirely upon your operation—thus the reason for control by testing. You can graph the results of your daily tests, checking continuously as to where your sand is headed and preventing it from falling off too sharply. When it starts off in the wrong direction, you can pull it back before any harm is done. Also use your instruments to check your squeeze and break test and observations. It is somewhat impractical for many reasons to check each batch, but enough checking of your feel against your instruments will in short order develop your sense of feel to a very fine point and to remarkable accuracy. Don't doubt this; just try it. Or try running 2000-lb batches every 15 min for nine hours a day through a mill with each batch coming in at different temperature, moisture and bond, and check each and every batch!

But do by all means check with your instruments at regular enough intervals each day to establish your control. Contrary to some beliefs, synthetic sand will not poop out with a bang. Meter your water. As to synthetic sand's drying out faster than natural bonded sand, yes and no. If you have 3 per cent moisture in the synthetic and 7 per cent moisture in the natural bonded sand and lose 3 per cent moisture from each in a given time, you have 0 and 4 per cent left, respectively.

Charlie

PANGBORN CORP. MARKS GOLDEN ANNIVERSARY

A NEW world has been made since Thomas W. Pangborn founded the Pangborn Corp. in New York City in 1904. It was born of mechanical developments which could scarcely have progressed as they have without blast cleaning and dust control equipment like that manufactured by Pangborn. Celebrating its 50th anniversary this year, the firm proudly contemplates the fact that 28,000 of its machines are serving industry.

JOHN C. PANGBORN

A year after his brother had established the company, John C. Pangborn joined him. In 1908 the organization was moved to Jersey City, N. J., and in 1912 it made its final move, to Hagerstown, Md. In 1917 a foundry was started there and has been in active operation ever since. Today, Pangborn Corp. is one of Maryland's largest industrial organizations. Its plant covers 11½ acres and has over 1000 employees. The company's products are sold by a staff of 35 district sales engineers and dealers in important manufacturing centers in the U.S.A. and by foreign dealerships in nine areas overseas.

First product of the firm was an airblast tank or hose machine. It consisted of a strongly constructed steel tank which utilized sand expelled by compressed air to blast-clean metallic surfaces. Originally, these machines were used in home-made wooden rooms designed to confine flying sand and resultant dust. Ventilated steel blast rooms were a later development, and attempts to control the dust from blasting operations eventually gave rise to Pangborn's entry into the field of dust control.

A further development was the substitution of metallic abrasives, in the form of shot and grit, for sand. The metallic abrasive does a better job than sand and can be used over and over. Many of the methods of blast cleaning were pioneered by Pangborn.

Thomas W. Pangborn, born in Brooklyn, N. Y., began his industrial apprenticeship at the age of 17 with the Belleville Copper Rolling Mills, Newark, N. J. He attended Pratt Institute in Brooklyn in the evenings and began experimenting with development of his sandblasting machine. He has headed the Pangborn Corp. since its establishment in 1904.

Active in business, banking, insurance, religious, educational, government and social organizations, Mr. Pangborn is a past president of the National Foundry Association. He is also a former national director of the American Foundrymen's Society and has been an officer of various other business and trade groups.

John C. Pangborn left the Western Electric Co. in 1905 to join his brother in the Pangborn Corp. and has served as first vice president and treasurer. He also is active in the affairs of social, religious and educational institutions.

In 1945 the Pangborn brothers established the Pangborn Foundation, a trust to give aid and encouragement to charitable, religious, educational and scientific activities. Since then, the foundation has aided many such causes. In May, 1954, the foundation donated $50,000 to the AFS for foundry educational purposes, particularly at the secondary level.

A program of events to celebrate the company's 50th anniversary will take place Sept. 1 and 2. On the official anniversary date, Sept. 1, an open house will be held to which the public is invited. From noon to 4:00 p.m., tours will be made through all departments while work proceeds as usual. At 5:00 p.m., all Pangborn employees and visitors will gather on the lawn in front of the main office building, where an employee of the company will unveil a tribute to the Pangborn brothers as a gift from all employees. The evening of Sept. 2 will be Employees' Night, for which entertainment has been arranged.

THOMAS W. PANGBORN

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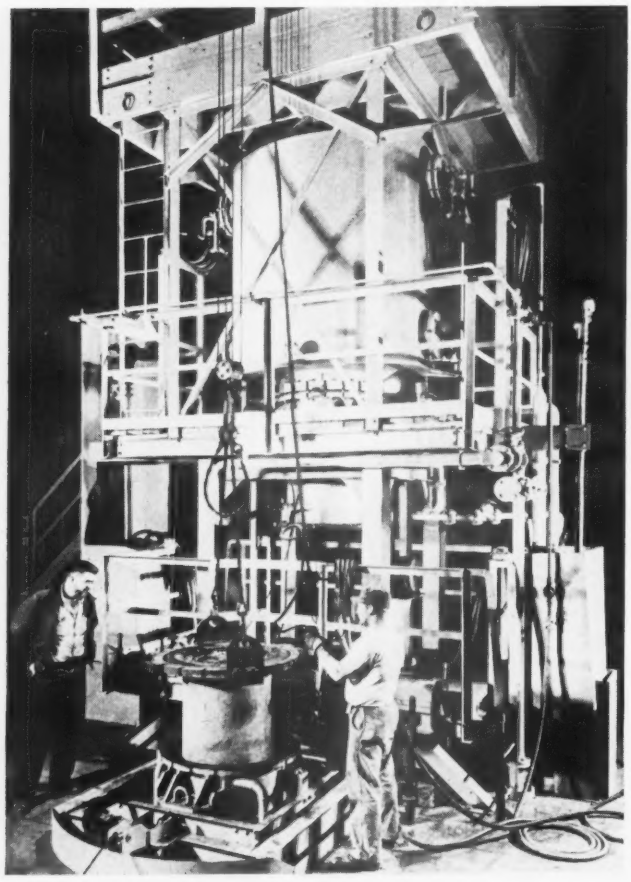
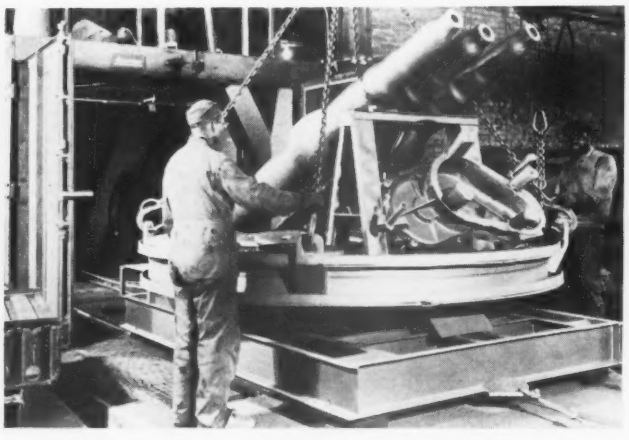
NEWS VIEWS



TITANIUM REMELTING FURNACE: Design of larger furnaces and substitution of a special vacuum melting procedure for conventional inert gas atmospheres improve metal quality and point way toward cost reduction, according to the Titanium Metals Corp. of America. Giant 20-ton automatic double-melting furnace, shown above, remelts 4000 lb ingots with improved metal homogeneity



FAST BLAST: Car-type cleaning room at a Chicago steel foundry performs airless blast cleaning on average loads of 4000 lb in 12 min in green stage and 24 min in annealed and heat treated condition. American Wheelabrator & Equipment Corp. manufactures the unit shown carrying a load of three 800-lb truck differential housings, a 300-lb gear case cover, and thirteen 100-lb covers

SOLID FOUNDATION: As part of a $5-million expansion program, Kropp Forge Co., 5301 West Roosevelt Rd., Chicago, is installing two 50,000 lb drop forge hammers, largest in the world. The foundation, 42 ft wide x 36 ft long x 23½ ft deep, also will include 5½ million lb of concrete and reinforcing steel, and including the hammers will weigh about 8 million lb. Anvil base, above, is one-third of the foundation, weighs 390,000 lb, and fifteen men labored three days to unload it from flatcar

HELP ON WHEELS: An ingenious, compact, efficient, company designed and developed, mobile first aid unit is easily handled by plant nurses. It is used in the plant of Barber-Greene Co., Aurora, Ill., to carry every needed item of first aid equipment from stretcher to artificial respiration instrument to any part of the 500,000 sq ft plant. A plant nurse is shown demonstrating how the unit is used in responding to a call. The company produces materials handling and road building machinery

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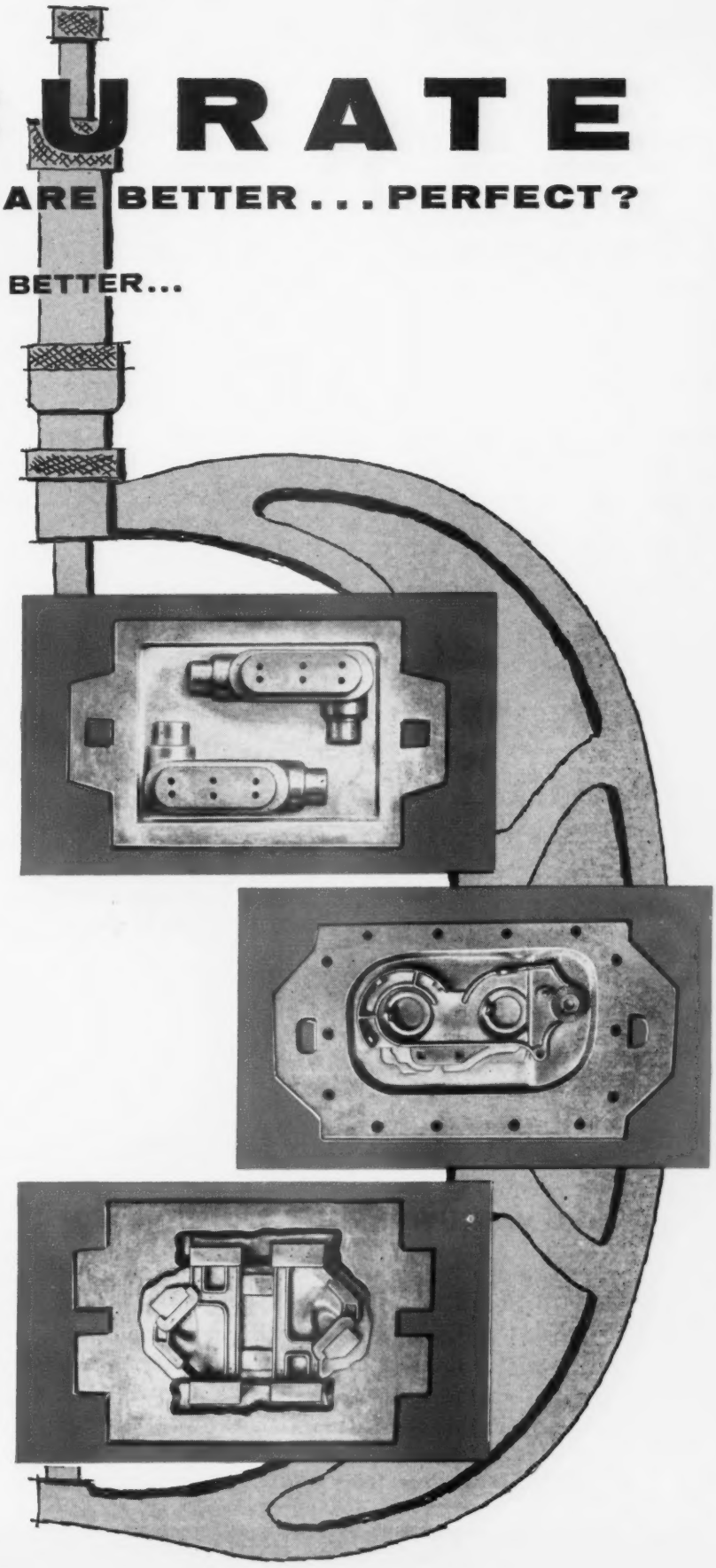

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Bimetallic Castings

(*Continued from page* 105)

duty alloy cast iron, use is made of two 400-kw. high frequency inductions furnaces (Fig. 5), each of 1200-lb capacity, which are operated alternately. These furnaces allow for one charge per hour.

Some pots, made in alloy cast iron, are cast white and annealed in a gas-fired tunnel furnace which has a 20-minute cycle with three periods, one for preheating, one for soaking at 1890°F and one for cooling.

Metal is drawn from the holding furnaces into trolley ladles and hand ladles and is poured into centrifugal casting machines (Fig. 6). There are 45 of these machines, designed and made by the firm, of which 38 are of the small size and 7 of the larger size. The smallest machines have an internal diameter of 1½ in., whereas the largest has a diameter of 20½ in. Length of pots and other cylindrical castings spun in these machines ranges from 6 to 21 in. and the thickness from ¼ to 2 in. Peripheral speeds of the machines range from 1200 to 1500 fpm. Metal is poured at temperatures ranging from 2250 to 2370°F and up to 2730°F for special castings. Metal molds are made of low phosphorus iron with a hematite base.

About 4700 hours per week are worked by the 105 men in the centrifugal foundry. The 150-ton output of rough castings per week yields about 100 tons of finished castings, since a length of 1½ in. is cut from one end of each casting and 1 in. from the other.

One outstanding claim of the company is that every individual part it makes undergoes inspection at practically every stage of manufacture so that it can be traced back to the original batch of metal. This process begins at the cupola stage, where the usual analyses are carried out. Control of the finished parts is based on holding furnace units or batches. The holding furnace is filled by one ladle, and the necessary alloys and additions are made to it. After the metal has been held for the requisite period to insure thorough mixing and sufficient temperature for casting, a test bar is made, and all the castings from that batch of metal are stamped with the same reference number as the test bar which represents them.

Inspection Is Thorough

After the castings have been stamped, they are checked for dimensions with "go" and "no go" gages, file-tested for chill and visually examined for surface defects and finish. They then are passed to the part-off section for removal of the discard ends. These discard ends are numbered to correspond with the castings from which they were taken, and the face adjacent to the casting proper is prepared for micro-examination to check wear resistance structures. Each casting is stenciled with code markings indicating material specification, size and day of cast. Each casting then is hardness checked before passing to stock. Representative castings are taken from each furnace charge to test for Ex value and tensile strength. Fig. 7 shows part of the castings stockyard with the markings on the pots.

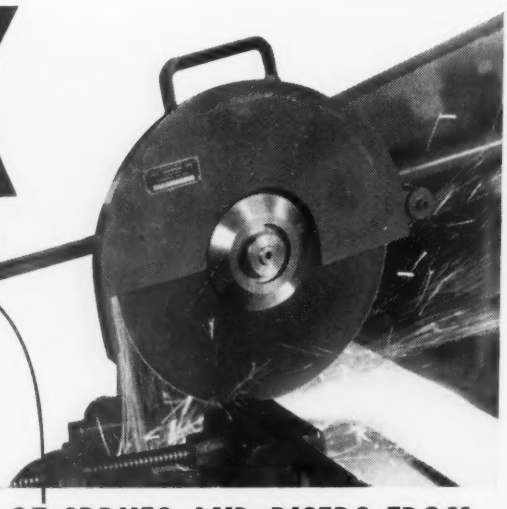
The largest pots, for marine engine piston rings, are made separately in a gray iron foundry attached to the centrifugal foundry. The patterns are of wood or metal and are rammed with green sand which, after removal of the pattern, is dried in large ovens held at about 450°F. For casting, the mold is assembled with a circular oil sand runner basin on top of the mold; this basin has pencil ingates spaced

(*Continued on page* 214)

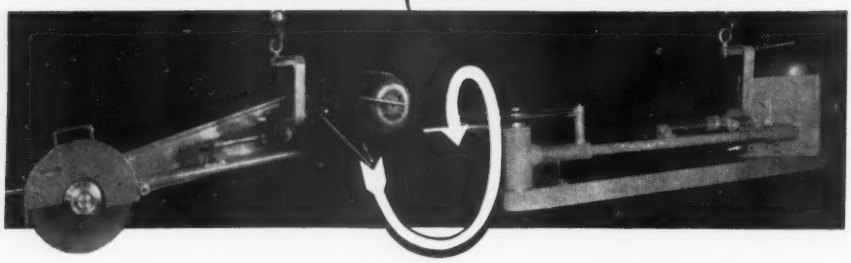
FOX

SWING FRAME

CUT-OFF MACHINE



FOR FAST REMOVAL OF SPRUES AND RISERS FROM BRONZE, ALUMINUM AND IRON CASTINGS!



FULL MANEUVERABILITY THROUGH 180°

The new Fox Swing Frame Cut-Off Machines have been designed to take advantage of the new type "flexible" cut-off wheels. The machine has full maneuverability through 180°. It is especially recommended for the removal of sprues and risers from bronze, aluminum and iron castings.

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OLIVER BUILDING PITTSBURGH 22, PA.

Small additions of **MCA RARE EARTHS IN NODULAR IRON** help to produce consistently good ductility by counteracting tramp elements such as lead and titanium.

Operating the **world's largest** Rare Earth deposits, Molybdenum Corporation has conducted extensive research in its properties, application and possibilities.

MCA metallurgists will be glad to furnish information on how MCA Rare Earths may assist in your nodular iron problems.

As recognized authorities in the application of Molybdenum, Tungsten, Boron, Rare Earths, and the alloys and chemical elements of these materials, MCA assures confidential and immediate response to inquiries.

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Subsidiary: Cleveland-Tungsten, Inc., Cleveland, Ohio
Plants: Washington, Pa. and York, Pa.

MCA

(*Continued from page* 212)

equally around the circumference to form controlled pouring under "trapped" conditions.

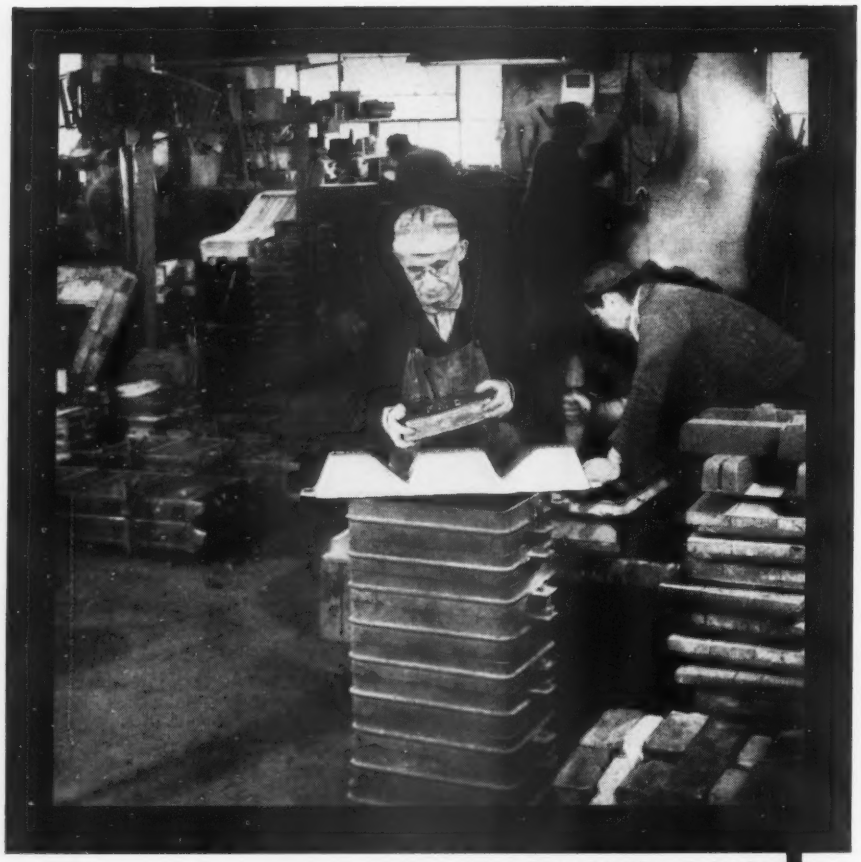
To revert to the bonding of the cast iron ring groove carriers to the piston heads, the rings are first cut from the pots, at the size required for the particular type of engine in which they will be used. It will be appreciated that the weakest part of the light alloy piston, particularly in diesel engines, has been found to be the top ring groove, which is the seat of heavy wear; hence the advantage of being able to insert a ring groove made from a wear resisting alloy—in this instance, austenitic cast iron. With such inserts, nearly 200,000 miles can be achieved. The firm now produces pistons from 2½ to 12½ in. in diam with Ni-resist ring groove carriers integrally bonded in position.

Bonding Combined With Casting

The rings are bonded before the ring grooves are machined. This operation takes place in the aluminum foundry at Lymington, where about 170 men are employed in the melting and casting section, with a normal working week of 44 hours and currently with about 2 hours per night of overtime up to three days a week.

The bonding operation is combined with the permanent mold casting of the pistons themselves. In this foundry the primary alloy is melted in an oil-fired rotary furnace of 3000-lb capacity. Molten metal, at an average temperature of 1275°F, is carried to a battery of bail-out oil fired furnaces of 300-lb capacity by means of a ladle specially designed by the firm (Figs. 8 and 9), which is carried on a trolley and pours the metal in the bail-out furnace by hydraulically controlled lift. At the time of writing, 30 bail-out furnaces were in operation (Figs. 10 and 11), and a further battery of 30 was being installed in a parallel line. Each individual furnace has its own temperature recorder, so that each furnace can be controlled separately. In addition to the primary molten metal supplied from the rotary furnace, each bail-out furnace is fed with supplementary ingot metal. A number of permanent mold diecasting machines (or gravity-type as the English term them) are located behind the furnaces (Fig. 12).

The austenite ring carriers are dipped into the molten alloy in the bail-out furnaces at a temperature and for a length of time determined by the size of the ring. During the immersion in the bath, the process of bonding between the molten aluminum alloy and the solid ring takes



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place (Fig. 13). The ring then is transferred directly to the permanent mold and placed into position in the mold, and the alloy is poured while the bond layer is still molten. After solidification, the iron ring has become an integral part of the casting through molecular bond between the dissimilar materials (Fig. 14).

Many other forms of inserts are dealt with in a similar way. These include steel liners for aircraft and road vehicle cylinder barrels, cast iron skulls for locating valve seats and spark plug threads, bimetallic brake drums, bonded bearings, gears, etc.

Final machining of the ring grooves takes place with the ring in position in the piston head. The piston castings are heat treated and aged in a furnace prior to this operation. Pistons and other parts are conveyed from the castings stores to the machine shop by ordinary four-wheeled carts. This method was found to be the most flexible and efficient, considering the great variations that exist in the size, shape and weight of the parts to be put into operation. It also has been found that charging ingots by hand into the primary furnace is the most satisfactory method.

Reference already has been made to the importance given to testing and control. Control of the metal from which the cylindrical castings are made at the Ringwood foundry has been discussed already. The light alloy castings are cast in permanent molds, and special precision machine tools are used for machining. Apart from metallurgical and physical characteristics, the special items of importance in relation to the ring inserts and piston heads concern dimensions. The groove ring inserts are marked so as to identify them with the pots from which they have been cut. Care is taken to insure that the insert is radially true to the piston's vertical axis and that it is in position when finally machined to ± 0.020 in. Similarly, the latest types of inspection equipment are used for the various other components made.

Book Review

Metal Statistics—1954 edition, published by the American Metal Market Co., 18 Cliff St., New York 38. Price $3.

This reference guide contains up-to-date, as well as historical records of production, consumption, stocks, imports and exports, monthly and annual market price averages of various metals, as well as information on miscellaneous economic subjects. This 47th annual issue is of hand pocket size.

Here's Why TRU-STEEL Cuts Your Cleaning Costs!

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Which Do You Need— WORKING OR THINKING FOREMEN?

By EUGENE FRY

EVEN in "good" times there are periods of recession in almost every business, affecting nearly every plant. Apparently, the logical approach is to expect this variation in business and to be prepared to cope intelligently with the future.

During a period of transition, an executive may decide to keep all his supervisors on a full-time basis, if possible. Sound reasoning advises him that the same know-how still will be needed to make his company's products. And when customer demand again resumes its normal volume, the key men will be there to expand operations smoothly with called-back and new employees.

What is expected of these foremen —who seemingly have time on their hands, with fewer workers to oversee and with fewer salable products emerging from their departments— can make all the difference in whether or not a company comes through this period comparatively unharmed.

Through bitter experience, many executives have found it the height of economic fallacy to demand that a supervisor be a worker and a foreman at the same instant. The obsolete thinking that a slow period is the ideal time for a foreman to pitch in and do all he can himself, in order to drop another man or two from the payroll, has proved time and time again to be a costly mistake.

Supervision Still Needed—If maximum supervision is not maintained during slow periods, scrap and manhour graphs may push through the ceiling as production goes down.

If supervision is diverted into production, over-all results are seldom satisfactory. The poor judgment of such a course is soon reflected in higher rejection percentages from the inspection department and less productivity per remaining worker. No matter how versatile the foreman may be, it is physically impossible for him to oversee adequately the work of others while bent over a machine turning out production.

Aware of the fact that on a low production schedule, a single defective unit becomes important, although it might be absorbed almost painlessly at full production, alert management will do everything possible to insure more, not less, supervision during this precarious period.

Slicing production workers to a point where foremen must take a direct role in getting out available orders only adds to the troubles already at hand. Although the foremen may turn out excellent work, performing every operation themselves, what happens in the surrounding work area?

A foreman undoubtedly is charged with a certain degree of responsibility in safety rule enforcement. How much safety guidance can he sandwich in if he has been assigned to punch the buttons on a machine? His concentration must be solely upon the work he is performing, for if he is distracted in the attempt to watch others on his shift, he may appear on the casualty list himself.

Accident Rate Increases

It seems then, that if the foreman is engaged in turning out work, the rest of the men will just have to look out for themselves; not much imagination is required to guess how the injury frequency is going to stack up at the next safety meeting. As more manual labor is exacted from a foreman, his department will show a correspondingly higher rate of accidents and consequent lost time and correspondingly lower quality and quantity of production.

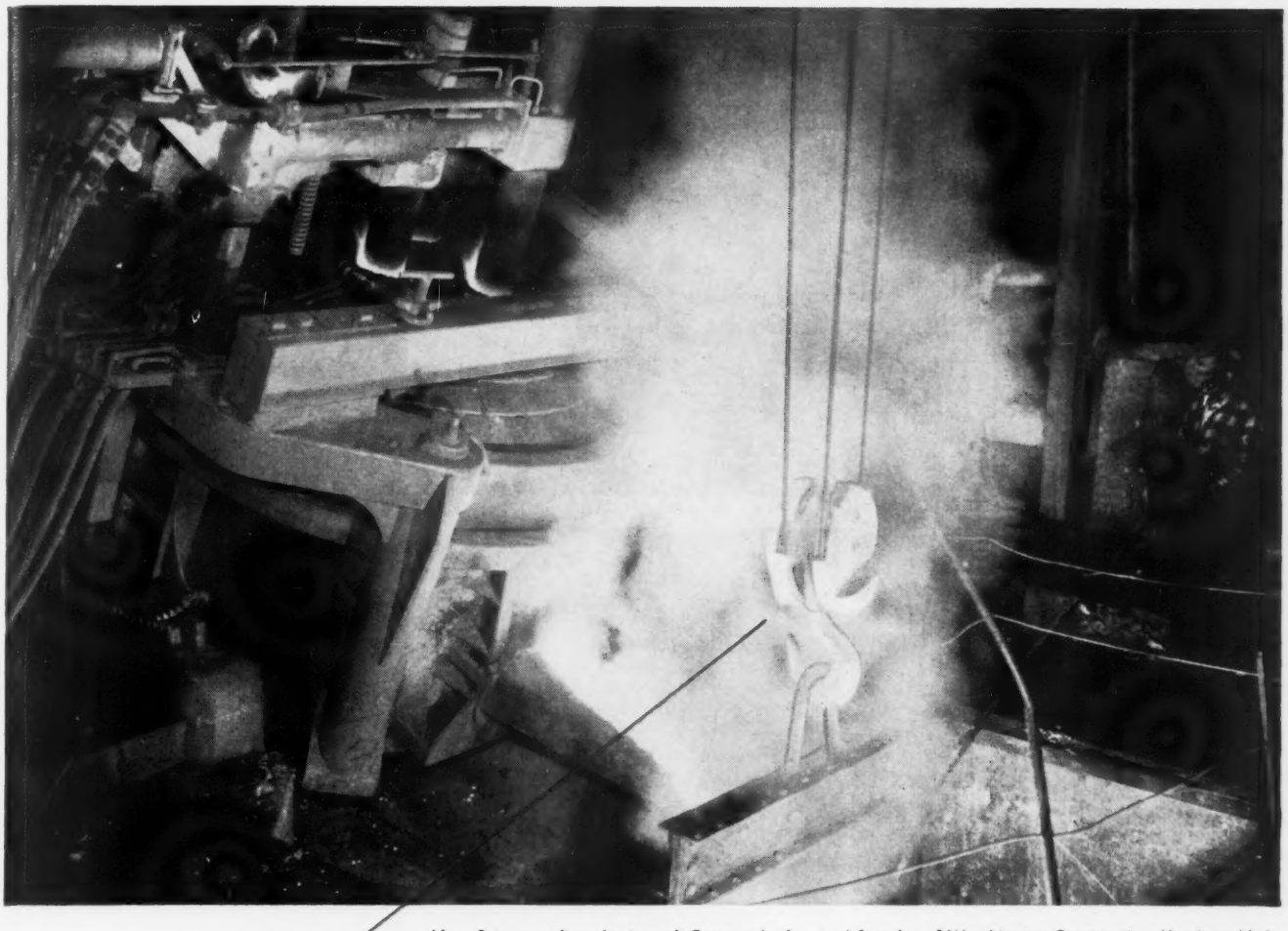
It is a duty of top management to avert panic when a sudden slump in orders is felt. Decisions, however hasty, made at the outset of the crisis must be sound, or a first-rate catastrophe may engulf the organization. Plants which have devoted some previous thinking to what to do in such an emergency undoubtedly will find the going easier.

A commonly disconcerting feature of recessions is that management seldom can foresee with accuracy their severity and duration. Consequently, the correct time to plan for slack periods is when everything is swinging along normally.

To draft an outline, which will act only as a possible guide, the key men —the supervisors—who actually direct production, should be called in and briefed on the gravity of the problems that may some day confront the company. A regular war

(*Concluded on page* 219)

"Ssst bud, be on your guard—that big fat slob of an inspector who always wears the checkered suit's snooping around today."



New 2-ton-per-hour Lectromelt Furnace in the steel foundry of Worthington Corporation, Harrison, N. J.

LECTROMELT* helps Worthington meet today's demand for finer steels

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If you are interested in improving and speeding up your steel or iron production, a Lectromelt Furnace may be the answer. Lectromelt engineers will help you decide.

For a free copy of Bulletin No. 9 describing Lectromelt Furnaces, write Pittsburgh Lectromelt Furnace Corp., 314 32nd St., Pittsburgh 30, Pa.

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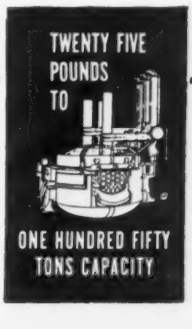

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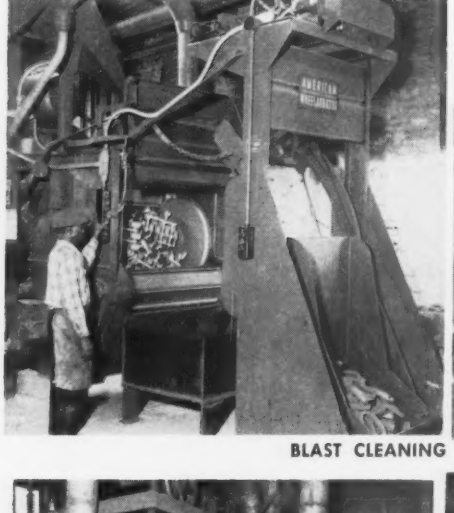
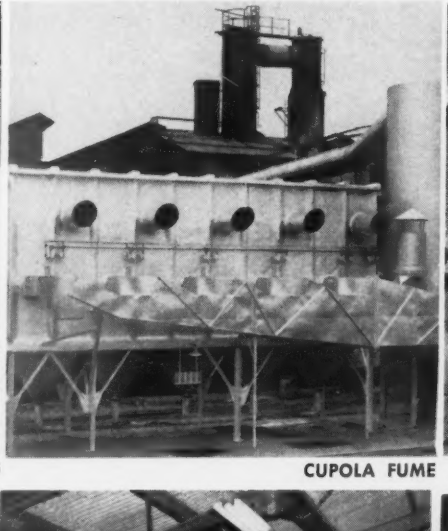
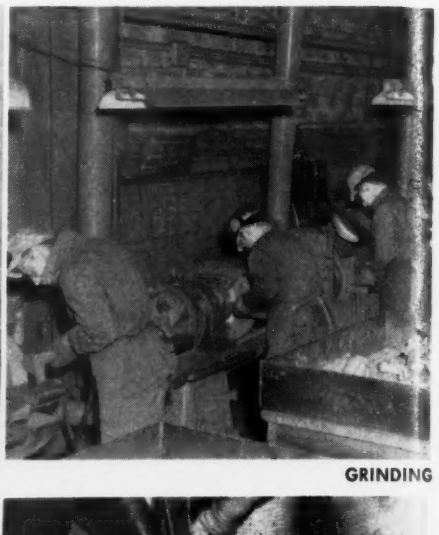


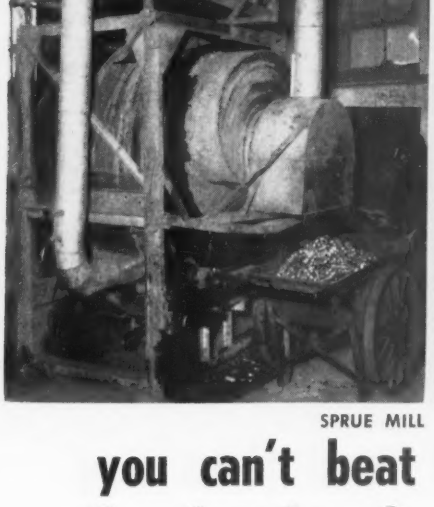
BLAST CLEANING



CUPOLA FUME

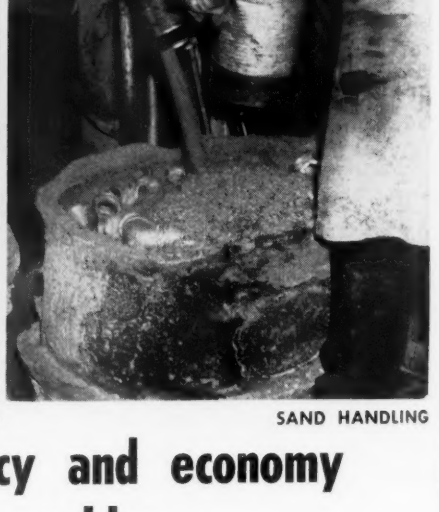


GRINDING



SPRUE MILL

TUMBLING



SAND HANDLING

you can't beat DUSTUBE'S efficiency and economy for foundry dust and fume control problems

Users throughout the foundry industry have found the high efficiency and simplicity of Dustube cloth tube-type dust collectors an unbeatable combination for top performance. Results prove that they meet the most exacting requirements at the lowest possible installation and operating costs.

A Chicago foundry, for example, uses several Dustubes for ventilating five pieces of cleaning equipment and a battery of grinding stands, and reports, "In terms of efficiency and cost-saving performance, our Dustubes are the best investment we have ever made."

Even on the most difficult foundry ventilation applications—such as controlling electric furnace and cupola fume—Dustubes have proved their superiority as a positive means of completely eliminating stack effluents. At a prominent steel foundry, five tons of very fine dust and fume from its two five-ton electric steel melting furnaces are trapped weekly in a Dustube Collector instead of permeating the atmosphere.

Another example of Dustube efficiency on a "tough" problem is its performance at an Ontario foundry in controlling the extremely dusty operations of packing and unpacking pots in which hard iron castings are packed for annealing. No dust escapes into the atmosphere, working conditions are excellent and this area of the foundry is exceptionally clean.

Dustube Collectors have proved their superiority by controlling the dust and fume problems in foundries where other methods have failed. If dust is a problem in your foundry, you will find it profitable to discuss your problem with Dustube engineers. Write today for complete information.

Catalog 372 explains the reasons why Dustube Collectors control dust more efficiently at lower cost. Send for your copy today.

American
WHEELABRATOR & EQUIPMENT CORP.
505 S. Byrkit St., Mishawaka, Indiana

dustube® COLLECTORS

(*Concluded from page* 216)

council should be held. Surely this group will come up with solutions above the capacity of one mind.

Re-examination of the prepared plan at a distant date may reveal that passing time has rendered useless some of the original ideas. Changed conditions, unforeseeable now, may warrant new approaches to the attainment of a painless plant slowdown. But the important thing is to have a skeleton, however flexible, to rally around. Even a patchwork plan is infinitely superior to no plan at all.

When a particular business hits a slump, whether it be a seasonal letdown, a mild recession or a real, cutthroat depression, quick adjustments have to be made to enable it to continue operation, even though on a somewhat restricted basis.

Advance Planning Aids Morale

A quick run-through of the plant reveals forced idleness. The thought comes promptly: These workers cannot tread water forever. The high rate of hourly wage scales makes the elimination of every unnecessary hour a must. So, the boss trudges back to the office and begins to figure all possible cutbacks in expense. He scans the payroll ledger, mentally checking the men from every department who must receive a layoff notice. Whether executed on a strict seniority or a merit basis, this paring must be done immediately.

He calls a supervisor's meeting in his office that morning. Everyone concludes that the best policy to follow is to be open and fair with all personnel. They already know that things are slow, that there are fewer sales; but it is decided that each foreman should explain patiently to his group the need to reduce the working force.

On the day of his layoff, every affected employee then will know that the decision was inevitable; and when he is called back, he will return to his job with far less bitterness than he otherwise might feel.

Now if a moderate payroll trimming eases the pain, why not go all the way for a cure? So the thought hits one that has come to so many executives, faced with a like circumstance: "Put the supervisors to work!"

He says to himself, "Well, the guys who direct the work should be able to handle a great portion of the actual production themselves. They definitely know how. They are reliable, smart, adaptable and loyal. They are on the job, day after day. Small illnesses that might deter an ordinary worker never keep these fellows from the job. By gosh! I think I'll put them to work next Monday! They can do all the work they can and supervise, too. We can really whack that payroll!"

The following morning, like many another dream hatched in the heat of emergency, seemingly correct at the first thinking, these plans no longer appear workable.

As a result, the boss decides that the safest course is to speed up rather than to curtail supervision. He figures that the small current production should be the best in quality his company has ever turned out. It seems logical to stir every remaining employee into motion, to co-ordinate efforts in a relentless war on this slump. He feels that if a "pulling together" attitude can be injected into the organization, there is little to fear in the way of permanent recession injury.

So the question presents itself again and again, from emergency to emergency: Do we need working or thinking foremen?

In a sense, this is a stupid way of phrasing an idea, because in thinking, foremen work at the same time. But "working" here means physical labor. Any supervisor will tell you that the effort involved in getting others to transform blueprints into salable products is far more taxing than merely operating a machine.

The original question will some day come up for answer in your plant: Should your foremen, in such a crisis, concentrate on doing with their hands the immediate project, or should they continue what they have been trained to do—see that others do the job in a satisfactory manner?

Innumerable plants experiencing solvency in lush times, fail to weather the storm accompanying an unexpected setback in demand for their products. Largely because of the lack of a preconceived plan of necessary steps to follow in this crucial period, utter chaos develops, and the company folds from within.

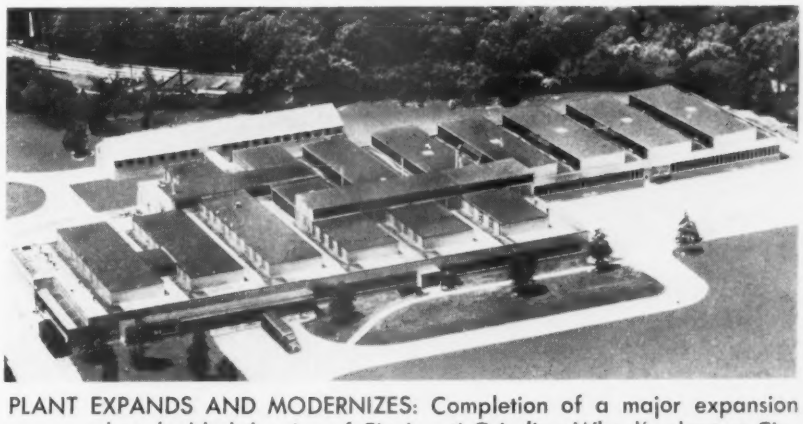
Many an organization's ability to stay in business, during such an ordeal, depends upon the management's final answer to the question of whether it needs working or thinking foremen.

X-Rays Subject of Digest

The first issue of an industrial house organ, ***Radiation Digest,*** published for those industries which employ x-ray, electron beam or other radiation devices, recently has been published by General Electric Co.

It contains a wide diversity of material, including predictions on the growth of industrial x-ray, plans for a West coast school on x-ray diffraction, improving x-ray films, the promise of lineal accelerators, how to reduce x-ray film processing time by 50 per cent, fast control with x-ray fluorescent analysis, and semi-automatic research through a combination of x-ray diffraction machines and analog computers.

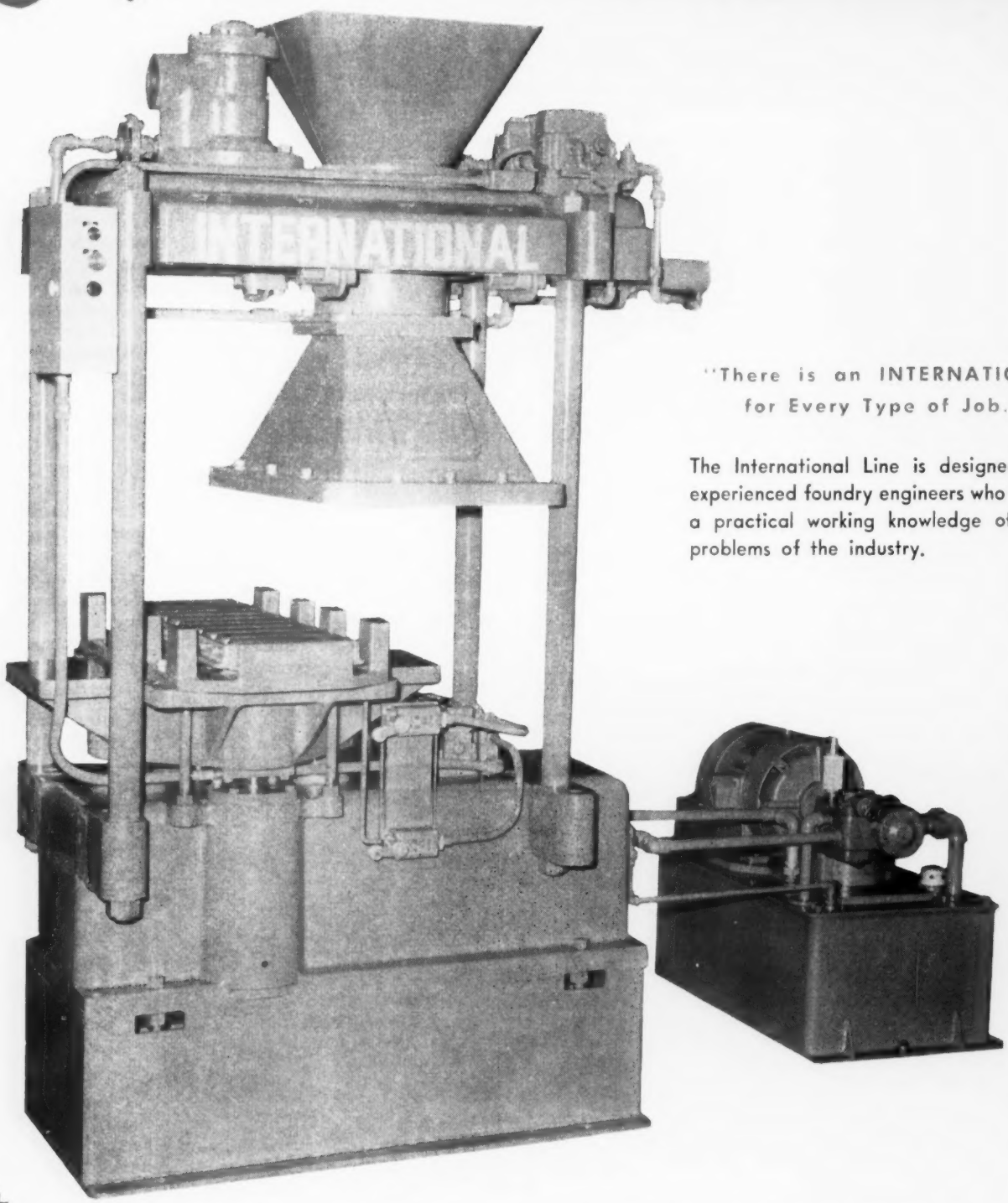
Copies of the quarterly publication are free and can be obtained by writing the X-Ray Dept., General Electric Co., 1855 Electric Ave., Milwaukee 1.



PLANT EXPANDS AND MODERNIZES: Completion of a major expansion program has doubled the size of Cincinnati Grinding Wheel's plant at Cincinnati (shown above). Addition of new equipment and a revision of manufacturing standards to include 36 quality control steps, now makes it possible to duplicate an original grinding wheel each time that it is reordered. A 256-ft continuous tunnel kiln, coupled with existing unit kilns, provides increased capacity as well as unusual flexibility

FOUNDRYMEN—here are the Sand Blowers you asked for.

INTERNATIONAL'S *New* SB13CH



"There is an INTERNATIONAL for Every Type of Job."

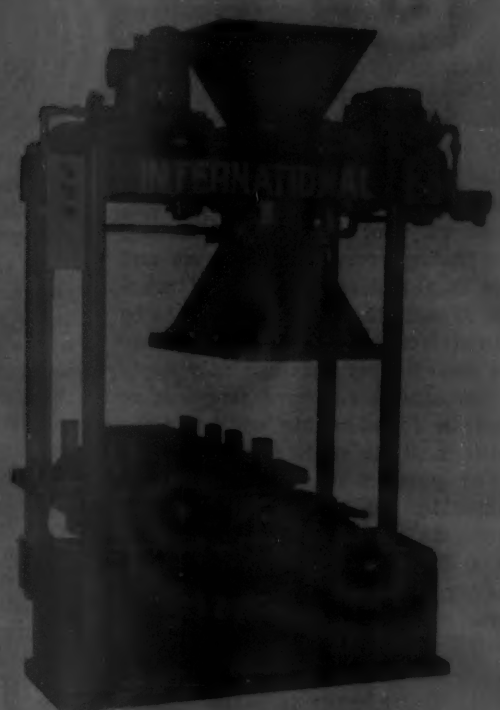
The International Line is designed by experienced foundry engineers who have a practical working knowledge of the problems of the industry.

INTERNATIONAL

SB13C SAND BLOWERS

Here are the Sand Blowers with all of the new features you have asked for—flexibility . . . simple design . . . ease of maintenance . . . faster operation . . . more positive action!

• The new SB13CH Sand Blower pictured on the opposite page is adaptable for cores up to 75 pounds • 10" throat opening for easy loading • Sand carriage rails and bearings completely shielded from sand • New-type exhaust valves • Sand carriage operated by a two-way pneumatic cushioned cylinder, trunnion-mounted for sure action — no springs • Two tandem-mounted hydraulic clamp and draw cylinders with two large chrome-plated guides provide positive clamping and accurate draw • Four support posts are movable for operations where side loading is desired • Draw table available with or without rollers • Completely electric automatic cycle control can be timed to the fastest or slowest jobs • Hand operated cycle control also available, if desired • Sub-bases available in heights to meet conveyor requirements (optional equipment).



TYPE SB13C MACHINE

The SB13C has the same capacity and dimensions as the SB13CH, but the clamp and draw cylinder is pneumatically operated.

MOLDING MACHINE CO. LA GRANGE PARK, ILLINOIS

Solving Brass Problems

(*Continued from page* 107)

have been accumulated during remeltings of part of the charge, such as gates, risers and defectives.

The best thing to do about gas and oxide content is to check melting conditions carefully from first to last. If crucibles were used for melting, see if any of the charge is exposed above the crucible to the play of furnace gases, See if the melting atmosphere is oxidizing or at least not reducing. With oil burners, check the furnace gases by holding a piece of slab zinc about 1½ in. wide and 6 in. long in several areas of the flame for 5 seconds at a time. If the zinc remains free of discoloration, the gases are not reducing. If the gases are reducing, the zinc will show a more or less black coating of carbon. The remedy is either to decrease the oil or to increase the air admitted to the burner. A reducing atmosphere favors the absorption of hydrogen.

Good Metal Makes Good Castings

Another way to restrict hydrogen absorption is to use the Pell-Walpole method of placing an oxidizing flux at the bottom of the furnace or crucible and finally deoxidizing with phosphor-copper. Another method is to flush the molten metal just before pouring by using the Spire nitrogen flushing system. This method is quite simple, and ladles fully equipped with the necessary nitrogen attachments can be secured. The production of satisfactory metal is the basis of all good castings. If the metal quality is satisfactory, at this point only two variables remain as far as the metal itself is concerned—namely, temperature and rate of pouring. These vary for each type of casting, and finding correct temperature and rate is a matter of empirical practice. If more than one casting is to be poured from a ladle, then obviously the ideal temperature can only apply to one, and a range of temperature must be found within which all the castings will be up to standard.

The pouring rate should be controlled by the smallest area of the downgate or sprue and should then be a fixed area for that particular casting. This point means that the sprue can be kept filled at all times during pouring, so that the pouring rate is not left to the man filling the mold. If the sprue is not kept full, air is drawn in with the metal, creating turbulence and danger of gassing. All pouring should be such as to have as short a distance as possible from the lip of the pouring ladle to the entry of the downgate; otherwise oxidation and gas absorption will increase. Bear in mind also that the molds should be waiting for the metal, not the metal for the molds. If leaky castings persist after establishment of a thoroughly satisfactory method of molding and pouring attention must be paid to other aspects of foundry practice.

Undoubtedly we have fractured our leaky casting at the point of leakage and have examined the surfaces thus exposed. We may have taken x-ray pictures also, but the most convincing evidence for the molder who made the casting is the fracture itself. X-ray often is very useful, however, in locating the point for fracturing. If there is any evidence of gas voids or shrinkage areas, we have something to go on, and we may be justified in going to chilling and risering.

Wherever possible, risers should be insulated. Blind risers (with access to atmospheric pressure) are to a

(*Concluded on page* 224)

NFA SURVEYS LABOR PRACTICES

Study Covers Over 1000 Foundries

National Foundry Association has completed a survey covering important labor agreement practices and policies of more than 1000 foundries throughout the United States.

It shows that for a typical medium-sized foundry in the United States: The odds are three to one that it has a union (probably the International Molders and Foundry Workers Union —AFL) and has a one-year contract. The union contract may or may not have a union security provision but it does provide for check-off of dues—and possibly initiation fees.

There is a 50-50 chance that the company will have an incentive pay system—and it is a toss-up whether the plan will be based on individual or group performance.

Employees normally are paid time and a half if they work more than 8 hours a day or 40 hours a week. They also receive time and a half for Saturday work and double time for Sunday. Lunch period of 30-minutes duration is unpaid. Provisions for rest periods or wash-up time are normally not spelled out in the contract.

A second shift worker will get premium pay ranging from 5 to 10 cents per hour; and in those cases where a third shift is provided for, workers get 3 to 5 cents more than those on the second shift.

The typical foundry contract also guarantees workers a minimum of four hours work if they are called in or not notified that there is no work on a regularly scheduled working day; however, if they are called back after their regular shift is completed, there is no guaranteed minimum of additional hours.

Six holidays are observed and paid for at the employee's hourly rate. If a holiday is worked, the employee gets straight time plus holiday pay. To be eligible for a paid holiday, however, he must work both the day immediately preceding the holiday and the day immediately following—and in addition, he must have been with the company for at least one month.

The average foundry grants one week's paid vacation after one year's service and two weeks after five years. During the vacation period the foundry is closed down for at least one week. If a holiday falls within an employee's vacation period he is allowed an extra day with pay.

Seniority is generally departmental but is modified to plantwide as a basis for layoffs. Seniority can be lost by a failure to report within five days following recall after a layoff—or absence without notification for the same length of time. Absence due to illness or injury outside of work does not result in loss of seniority. Super-seniority is not, as a rule, granted to union stewards and shop committeemen.

Grievance procedures are generally finalized into three or four steps with the requirement that the grievance be put in writing at the second step. Arbitration is the final step in the grievance procedure. Its cost is borne equally by the parties regardless of which is determined to be at fault. While employees involved are generally paid for grievance time union stewards are also paid for time spent in processing grievances but not quite so frequently.

Employees get these "fringe benefits": Group life insurance, accidental death and dismemberment insurance, hospitalization and sickness and accident disability insurance. However, only the accidental death and dismemberment insurance is paid for completely by the company; the others are paid for jointly by the company and the employees.

Pension and profit sharing plans are exceptions to the norm as are Christmas bonus plans, cost-of-living and productivity wage escalator formulas.

All Set and Ready to Go

SMITH L-O CORE OIL

When it comes to making accurate cores, the first requisite is an oil that's "ready to go" with your type of casting and type of sand used. It is for this reason that so many foundries order and re-order Smith L-O Core Oil. They know there is a grade that blends perfectly with their conditions . . . many know — through happy experience — that a Smith Foundry Service man was responsible for the selection of such a proper grade. If you need assistance, plus a core oil of guaranteed uniformity — look first to Smith L-O . . . the name that stands for a *service* as well as a *product*.

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- WESTERN FOUNDRY SAND CO. Seattle, Washington
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MANUFACTURERS OF L-O AND CERTIFIED CORE OILS
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NOW—a tool completely free from annoying projections and angles, fits the hand in an easy, natural grip.

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No Buckeye tools in your plant? Then select your air tools by comparison, not habit. We'll be glad to put a Buckeye tool on trial in your plant . . . just tell us where and when, we'll do the rest and let you compare. Naturally, there's no obligation.

Buckeye Tools CORPORATION
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(*Concluded from page* 222)

large extent insulated by the mold material. The importance of using atmospheric pressure of some 15 ps cannot be overestimated. Bearing in mind that this pressure is equal to 1 ft of molten aluminum or 4 ft of molten copper. To take advantage of this pressure, risers must not be allowed to freeze over, thus cutting off the molten metal from atmospheric contact.

Chills should have a cross-section at least equal to that of the part to be chilled. Iron chills are generally satisfactory, but should be coated with shellac before being placed in the mold, so that the molten metal may lie quietly on them. The matter of unidirectional cooling involves first of all temperature and rate of pouring, after which come chills and risers, gates, runners and sprues, as well as condition of sand, including its nature, and, if it is green sand, especially its moisture content. It is the proper balancing of these factors that results in a pressure-tight casting, and care must be taken to see that in placing a certain chill, one does not throw the rest of the cooling process out of balance. The same applies to risers, but to a lesser extent since they are not so drastic in their action. It may sometimes happen that it is best to pour the casting "two up," as the molder says, in which case we may have to consider two cooling systems, both unidirectional.

Cores Frequently Cause Trouble

Most castings require cores, which frequently cause trouble, especially in pressure castings. If cores are damp, they cause disturbance and introduce hydrogen. If too strong, they offer too much resistance and set up strains that are in excess of the strength of solidifying metal. On the other hand, cores may be so weak that impingement of the molten metal on them washes off sand grains that will lodge in critical areas of the casting. The dampness of cores can be due to their not having been dried for a long enough period or at a sufficiently high temperature; frequently it is due to lack of care in providing proper storage, so that the dry cores pick up moisture while awaiting use.

So far we have dealt with basic areas of operation to which attention must be given when casting trouble develops. Next month, in the concluding portion of this article, we will consider more specific steps that can be taken to solve our problems.

Investment Castings

(*Continued from page* 121)

If only these variations took place, the problem of producing investment castings would be relatively simple. But it would be true only of very simple designs, such as a cone or a wedge (Fig. 3). Such a casting would have gradually tapering sections of metal increasing in cross section back to the pouring gate, so that shrinkage could take place in successively heavier sections without causing any strain.

The demand for precision castings of such simple design is very limited. Greatest application of investment castings is in complex designs difficult to machine or fabricate by other processes. Consequently, in most parts produced by investment casting, the design is quite complex, often including interrupted sections, sharp angles and a great variety of cores.

Variables Effect Tolerances

As soon as the design becomes at all complicated, a new set of variables is introduced which will have marked effects upon tolerances. Let us suppose that instead of a gradually tapering section, such as shown in Fig. 3, we have a casting like that in Fig. 1A, with sections of several different thicknesses. If this casting is gated from one end, one heavy section is fed properly, but the second one must be fed through the thin section. The thin section, cooling first, may leave the extended heavy section without any liquid metal to draw upon as it solidifies. This condition may produce two undesirable effects in the casting. First, shrinkage or dendritic porosity may be produced, and, second, the stress set up by the solidification of this section may cause a twist or warp which will affect the dimensional accuracy of the casting. If certain angular relationships between points at the opposite ends of this casting are required by the print, only a very slight twist or warp will throw the casting out of tolerance. Fig. 1B shows this part in a cross-sectional view.

What must be done to correct this condition? If a second gate is placed to feed the second heavy section, the real source of trouble can be overcome. However, this gate will increase the cost of the casting considerably because more metal must be melted and fewer pieces can be fitted into the mold or flask. In addition, a second gate must be

(*Continued on page* 228)

This Holcroft Book belongs in YOUR Technical Library

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"Do we know all the methods of handling stock, and which would best suit our needs?"

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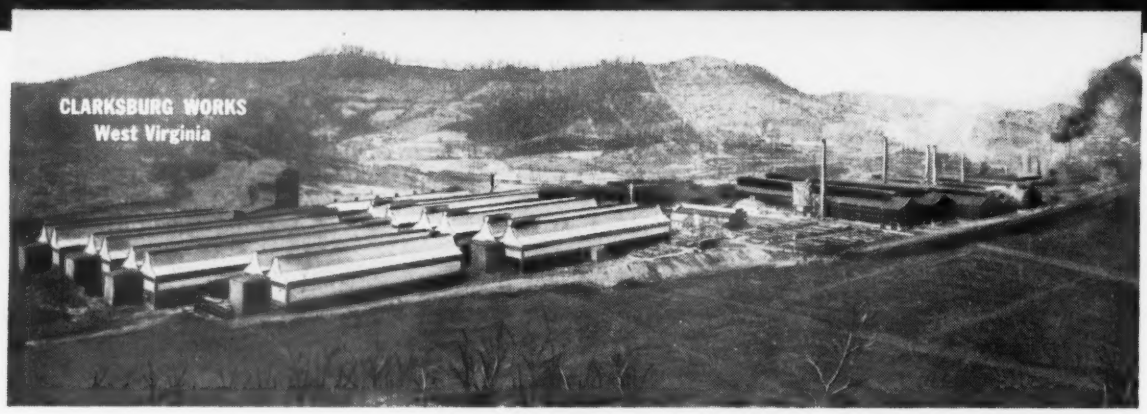

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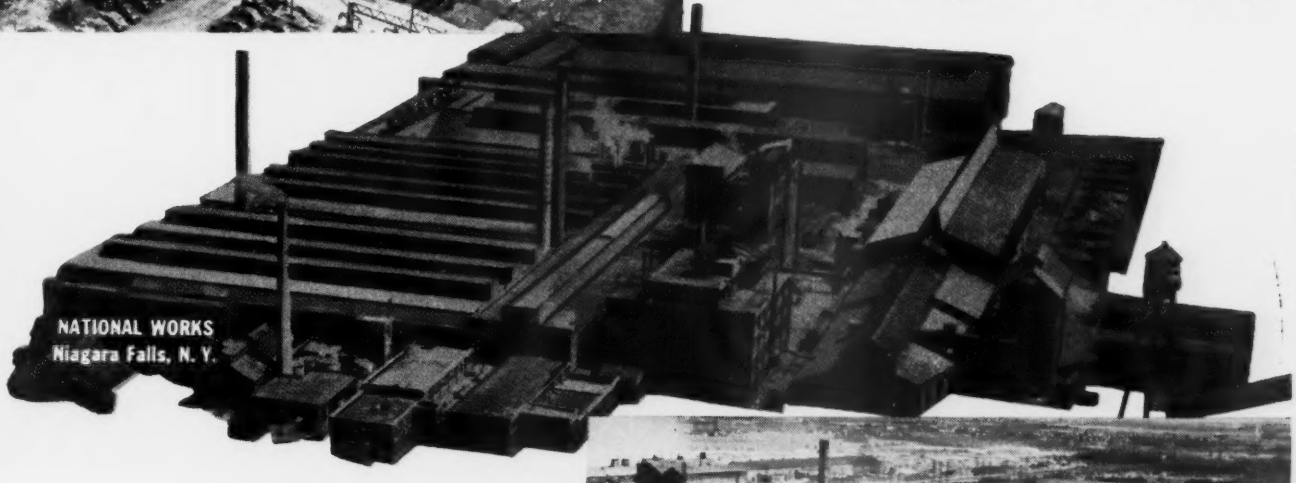

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(*Continued from page* 225)

cut off and ground, this time on a round surface. Thus the cost of holding this particular casting within close tolerances may be considerable.

The best solution was a compromise. Instead of casting the part to the finished dimensions, the central core was continued through in the uniform diameter, as shown in Fig. 1C. Three lathe operations were needed to complete the casting, but the cost of doing this machining was less than the added casting cost which would have been necessary to produce the piece in the original form. While this casting design still is not ideal, it was possible to obtain good pieces without metal shrinkage or dimensional deviations beyond the normal range.

Flatness of an extended surface is another requirement that can be met only when careful design is used. Fig. 2 shows a casting for which the critical requirement was flatness of both surfaces, without any cavitation at the center. To accomplish this, the wax pattern would have had to be made with unusual care and individual inspection. Cost would have been increased because the pattern would have had to be left in the die under pressure until it had cooled to room temperature. This is the only way in which a slight volumetric shrink of the wax, which would have resulted in a slightly dished surface, could have been avoided.

Redesign Is Successful

Another difficulty was introduced by the presence of the right angle between the two sections. It appeared on the print simply because it had been produced automatically by the machining operation which had been the previous method of producing the part. This design caused a zone of weakness at the section junction which in upper view of Fig. 2 resulted in cracking. A new design eliminated this zone of weakness.

The lower view shows the redesigned casting, which was produced successfully. The thickness of the lower section was increased to provide for a simple surface grinding operation which removed the need for trying to cast the part absolutely flat. A slight fillet at the section junction eliminated the zone of weakness, and no further trouble was encountered in maintaining good metal quality.

Fig. 5 illustrates a case in which the dimensional problem concerned was the maintenance of an exact straight-line relationship between opposite lugs. Because the core, which

occupies the central portion of the mold, will shrink less than the metal below it, there is a tendency for these two lugs to get out of line. It is not difficult to restore them to a straight alignment by a simple press operation, but in the first design of this casting, on the left, the lugs broke off at their junction with the main body. Just as in the previous part, the presence of a sharp right angle created a weak point in the metal which could not resist the stress of the straightening operation.

In the right-hand view, Fig. 5, it can be seen that slight fillets have been added to blend the lug into the main body of the casting. This change is all that was needed, and the part now can be straightened rapidly at a low cost. If for any reason this fillet could not have been added and an absolutely square shoulder had been essential, the cost and difficulty of making this part would have been much greater than it was.

Cores Complicate Controls

In addition to the fact that cores do not expand and contract at the same rates as the metal, their presence may complicate dimensional control in another way. The casting shown in the upper view of Fig. 4 is a radar waveguide with a long rectangular core which is supported only at the lower end. The boss at the upper righthand corner is solid. Because of the length of this core, a slight displacement is enough to shift it away from the inflow of molten metal and thereby destroy the accuracy of wall thickness. This shift cannot be predicted accurately enough to compensate for it in the die design, so that the part in its original condition simply could not be cast within the required dimensions.

The corrective action is shown in the lower view, Fig. 4. Running a core through the solid boss provides an anchor to the ceramic core. This right-angle support keeps the core from shifting, and complete parallelism of the walls can be maintained.

These are only a few of the variables that make predictions of dimensional accuracy in the investment casting process unreliable except when related to a specific design. Most well-established foundries have competent engineers who can predict the accuracy to be expected of a proposed casting. Use of their experience in preparation of designs will enable the purchaser of investment castings to get the greatest accuracy possible.

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• The CESCO No. 99 Respirator is covered by Bureau of Mines approval No. 2307 for organic vapors not exceeding 1/10 of 1% by volume.

Converts to Dust Respirator No. 96

• By simply replacing the vapor cartridges with CESCO filter pads, the No. 99 Respirator is converted to the No. 96 CESCO Dust Respirator. Filters are treated wool-felt with no outside screens or covers. The entire frontal surface of the filter is usable providing maximum efficiency and little resistance to breathing.

• The No. 96 Respirator is covered by Bureau of Mines approval No. 2167 for all dusts not significantly more toxic than lead.

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• The unique feature of quick conversion from organic vapor to dust respirator by merely changing the two cartridges or filter pads makes these highly efficient CESCO No. 99 and No. 96 approved Respirators very economical. You buy only one respirator and elements as desired. They save you money.

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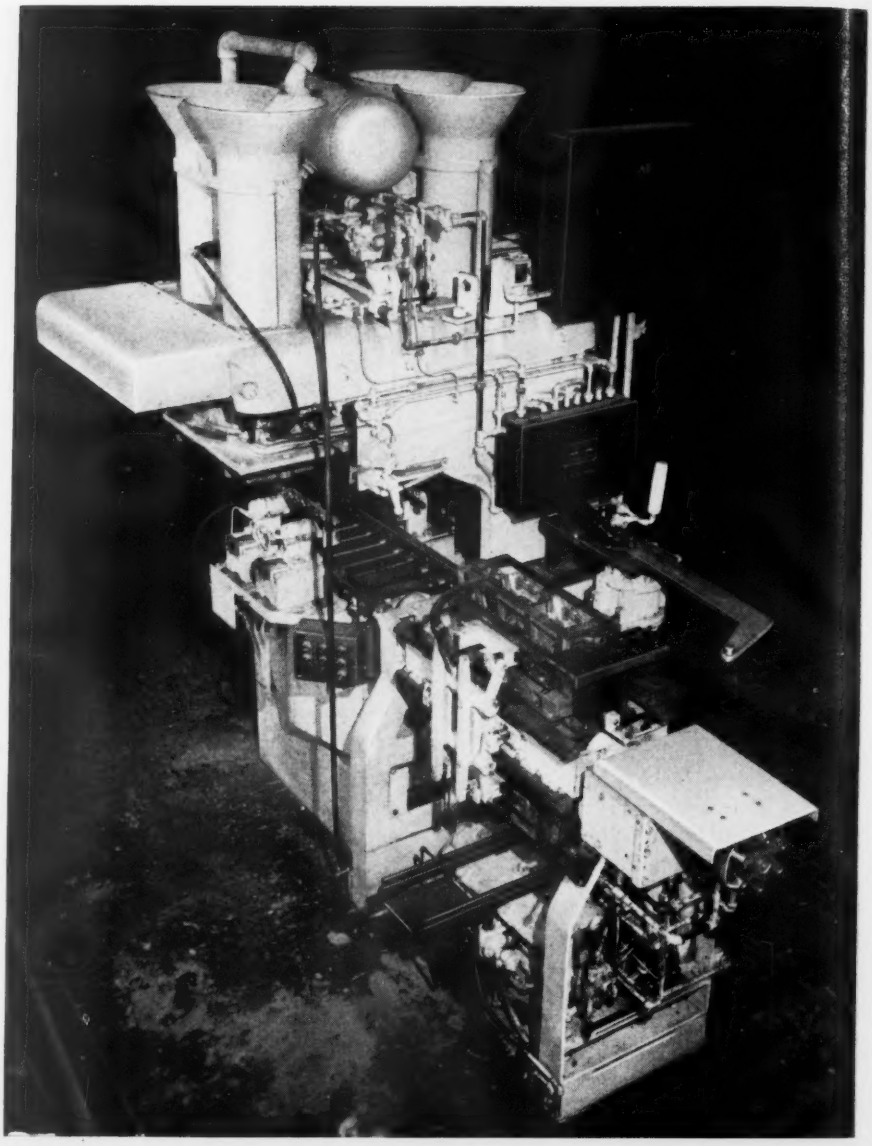
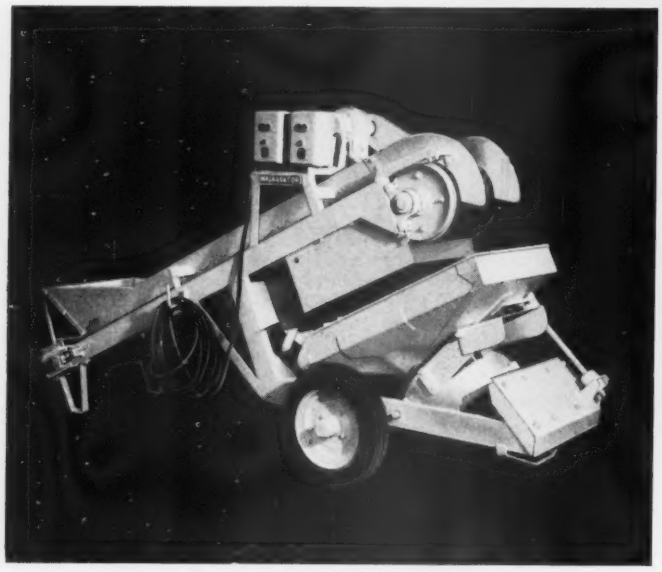
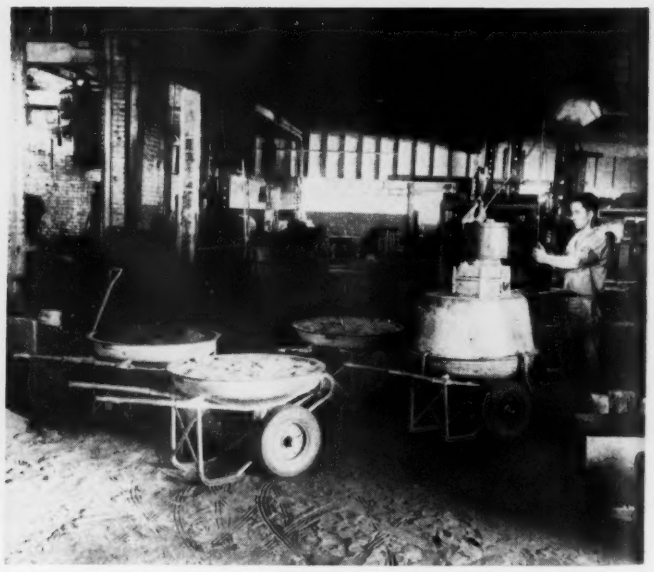
EQUIPMENT IN THE NEWS



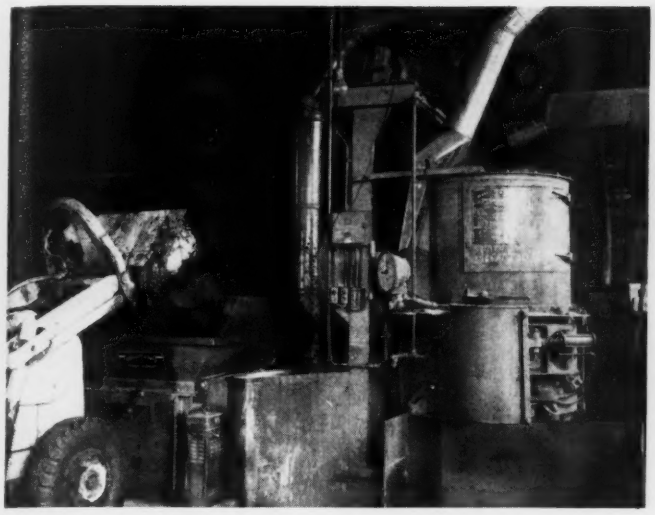
A NEW HIGH SPEED TRUNNION-TYPE ROL-A-COR will speed rollover, draw, and other handling of production and semi-production cores. Used here in conjunction with a Champion CB-18 dual-head Blomatic Core Blower, the TR Rol-A-Cor handles two different boxes blown under two magazines on the blower. The total time cycle for clamping, blowing, unclamping, indexing, rollover, draw, and elevation of core to handling height is only 15 seconds. *For full data write to Beardsley & Piper, 2424 N. Cicero Ave., Chicago 39, Ill.*



MORE EFFECTIVE SAND CONDITIONING for the small foundry is now available at a cost well within even the most moderate budget. Reports on the new low priced Magnarator, which offers convenient hopper loading, magnetic separation, thorough screening and full aeration, indicate that up to 20 tons an hour can be handled by this portable machine. *Beardsley & Piper, 2424 N. Cicero Ave., Chicago 39, Ill., will provide full details.*



REALLY PORTABLE MULLING EQUIPMENT offers the foundry core room maximum flexibility at great savings. The Krause Foundry Co. uses their Mulbaro with four mulling barrows. The sand is loaded only once—when it is put into the barrows—and is mulled, delivered, and used from the same barrows. The mulling mechanism is utilized more fully *with no time lost for sand handling. Get all the facts from Beardsley & Piper, 2424 N. Cicero Ave., Chicago 39, Ill.*



SMALL FOUNDRIES TOO can get all of the advantages of fully mulled and conditioned molding sand. This small, extremely compact Speedmullor-Preparator Unit is ideal for the small shop that needs complete sand preparation and resultant quality control. Six different low-cost units with capacities of from 7 to 70 tons per hour are available. *Send for all of the facts: Beardsley & Piper, 2424 N. Cicero Ave., Chicago 39, Ill.*

JOBBING FOUNDRIES HAVE A PROBLEM in handling a variety of short-run patterns. At Beloit Foundry much of this work is effectively handled on a J&J Jolt Rol-A-Draw. Pattern change time is minimized and machine handling of medium and medium-large flasks greatly reduces the load on cranes. The new J&J Rol-A-Draws feature *automatic air clamping of pattern boards. Beardsley & Piper, 2424 N. Cicero Ave., Chicago 39, Ill., will provide full data.*

80% OF BELOIT FOUNDRY'S DOUBLED TONNAGE is rammed by this Motive Speedslinger in a bay only 30 feet wide. Before its installation the foundry produced a little over 30 tons daily. After the Speedslinger was placed in operation this daily tonnage was boosted to 60. Not only that, but the foundry gets better results and can handle a wider range of large patterns. The slinger gives the foundry better control and uniformity too. *Write now for full information: Beardsley & Piper, 2424 N. Cicero Ave., Chicago 39, Ill.*

ACTIVITIES OF FOUNDRY GROUPS

Wisconsin

WISCONSIN Chapter of the AFS held its 19th annual outing July 30 at Maplecrest Country Club, near Kenosha, Wis., with 430 members and guests attending. Main attractions were golf, bait casting, baseball, and weight guessing, with a floor show following dinner. All who attended received a prize, donated by more than 125 supply houses.

In the contest to guess the total weight of six castings, Ed Mayer of Kaukauna Machine Co., Kaukauna, Wis., won first prize. He missed the actual weight of 160 pounds 6 ounces by less than a pound. Carl Van Buren, Allis-Chalmers Mfg. Co., took first prize in the bait casting contest, and George Zabel, Universal Foundry Co., Oshkosh, won low gross in the golf tournament.

H. F. Runkel, Lake Shore Sandy Stone Co., and Donald Gerlinger, Walter Gerlinger Inc., Milwaukee, were co-chairmen of the event.—*John E. Hubel.*

Chicago

AN ideal summer day was the weatherman's contribution to the annual stag outing and golf of the Chicago Chapter AFS on Saturday, Aug. 27. The place, as in past years, was Lincolnshire Country Club in Crete Township, Ill. Some 800 chapter members and their guests attended the event and participated in the day's events.

Golf was the principal activity for about 400. For the nongolfers, there was a choice of horseshoes and a bait casting contest.

The annual weight guessing contest was conducted throughout the day. John H. Harrigan, salesman, White Pine Lumber Co., took the prize with an on-the-nose guess of 116 lbs 8 oz as the aggregate weight of five castings, one each of steel, gray iron, magnesium, aluminum and brass.

Dinner was served in the big tent erected adjacent to the club house. This was a full-course deluxe repast a la buffet. Prizes to golf and horseshoe winners, and a fine array of door prizes, were awarded immediately after dinner. Several acts of floor show brought the party to an end.

The outing was arranged and directed by the chapter's entertainment committee headed by W. C. Kremer, Foundry Products Division, Archer-Daniels-Midland Co.

Serving as members of the committee were: J. C. Becker, Hewitt-Robins Inc.; J. S. Groh, Manley Sand Co.; A. A. Milkie, Pangborn Corp.; George Bowdish, Hill & Griffith Co.; Jack Absalom, American Steel Foundries; Chet Legg Jr., Wisconsin Steel Division, International Harvester Co.; Frank Scott, Crane Co.; David Matter, International Harvester Co.; J. C. Mulholland, Pettibone Mulliken Corp.; Robert W. Meloy, Link-Belt Co.; and Jack Fuqua, Calumet Steel Castings Corp.—*Erle F. Ross.*

San Antonio Section

FORTY-THREE members and guests of San Antonio section of the AFS Texas Chapter met at the Alamo Iron Works July 26 to view a safety film, "Live in Darkness," shown through the courtesy of the U. S. Air Force, Kelly Field, Tex., and "Whirl Gates," through courtesy of Steel Founders' Society. Refreshments were supplied by Tex-Aloy Foundry Co., San Antonio.—*E. W. Pruske, Alamo Iron Works.*

Michigan State

COLLINS Carter, president of Albion Malleable Iron Co., Albion, Mich., and immediate past president of AFS, was guest speaker at the April meeting of Michigan State College Student Chapter of the AFS. Mr. Carter talked briefly regarding activities and objectives of the AFS and encouraged support and participation in the organization's program as the students entered actively into the foundry industry.

Richard Dobbins, sales representative, Albion Malleable Iron Co., spoke on the function and organization of a sales department. Louis Bachinski, recent graduate of Michigan State College and now associated with Albion Malleable, concluded the program by showing slides and describing some of the molding equipment in use at the foundry.

Approximately 75 foundrymen attended the annual student-industry banquet held May 27 at Kellogg Center on the campus. Following dinner, John Smith, plant manager, Chevrolet Gray Iron Foundry, awarded 13 Foundry Educational Foundation scholarships to MSC students.

Main speaker was Gosta Vennerholm, metallurgist, Ford Motor Co., who talked on "Applications of Foundry Practices to Automotive Engineering." In addition to metallurgical advances in cast metals, Mr. Vennerholm spoke of the advantages of shell molding and recent experiments being carried on with water-cooled unlined cupolas.

A miniature sand muller, 2½-in. in diam, cast in aluminum by the students was given to each foundryman attending as a memento of the occasion.

Newly elected officers for the year 1954-55 are C. J. Thomas, chairman; Thomas J. Linton, vice chairman; Jacob Goldberg, corresponding secretary, and Richard Morris, secretary-treasurer.—*C. C. Sigerfoos, Michigan State College, and Thomas G. Thomas*

Northeastern Ohio

SEVERAL hundred members of Northeastern Ohio Chapter of the AFS participated in the annual summer outing June 26 at Twin Lakes Country Club, Kent, O. A golf tournament and softball game highlighted the entertainment. In the ball game, the vendors defeated the foundrymen 10 - 6 and gained possession of the rotating trophy, a filled miniature cupola, which reportedly allowed them to pour a liquid heat in celebration of the victory. Following a steak dinner, a drawing was held for several dozen door prizes.—*Kenneth L. Mountain*

All-Canadian Conference

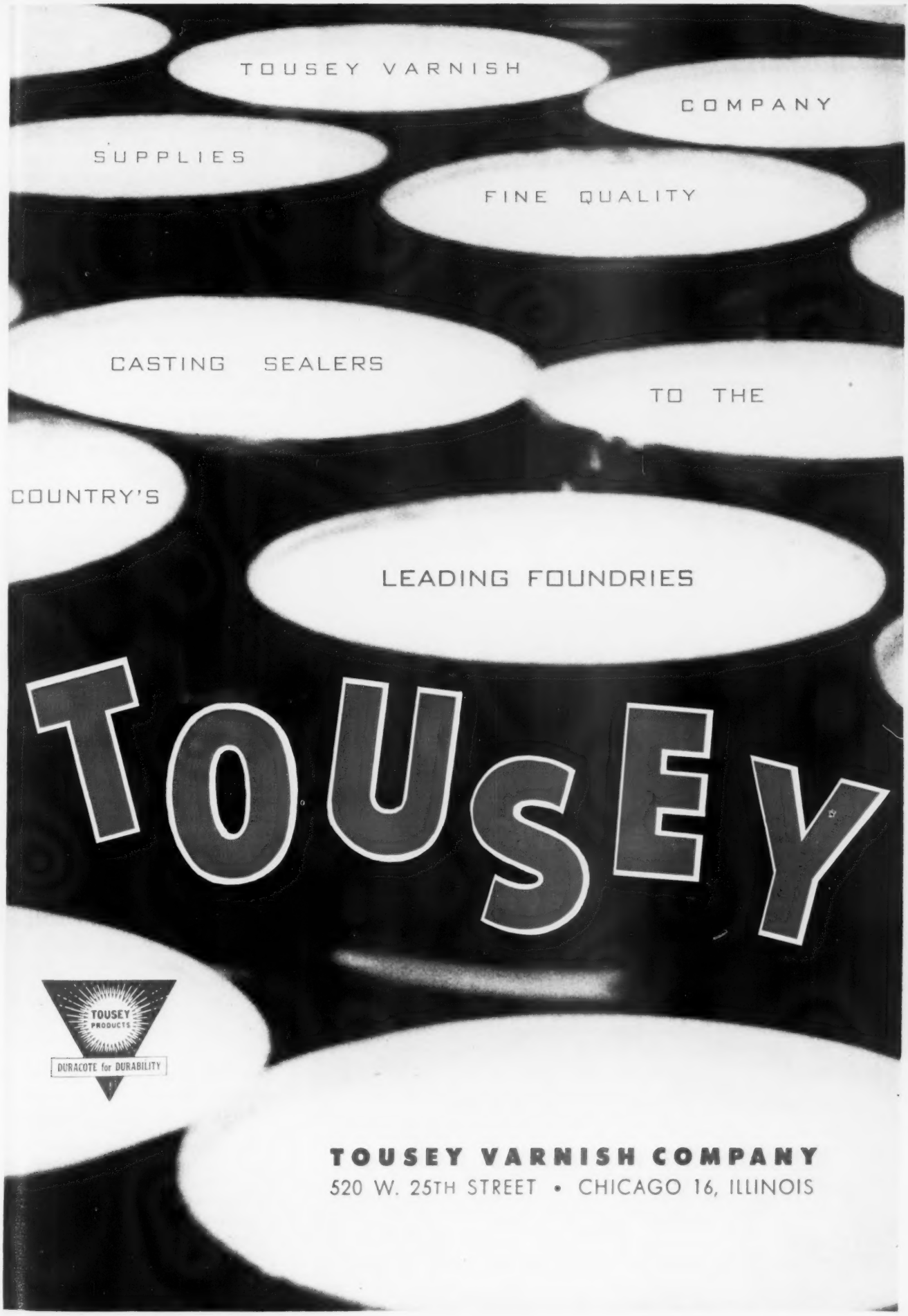
REVOLVING around the theme, "Foundrymen Forward with Canada," the fifth annual All-Canadian Foundry Conference will be held Oct. 28-29 at the King Edward Hotel, Toronto, Ontario, Canada.

Two half days will be devoted to a "Cost and Quality Improvement School." First half day will be a presentation of foundry fact-finding methods, advantages to be gained from accurate facts, and suggestions for proper assessment of facts and action to be taken upon them. During the second half day, representatives of several types of foundries will participate in a panel discussion presenting individual methods of cost and quality control, highlighting cases where specific improvements have been made. Delegates will be invited to participate in the discussion from the floor.

The American Foundrymen's Society films on horizontal gating and a new film on vertical gating will be viewed, with discussion on the practical applications of the principles involved.

Thomas E. Barlow, sales manager.

(*Continued on page* 234)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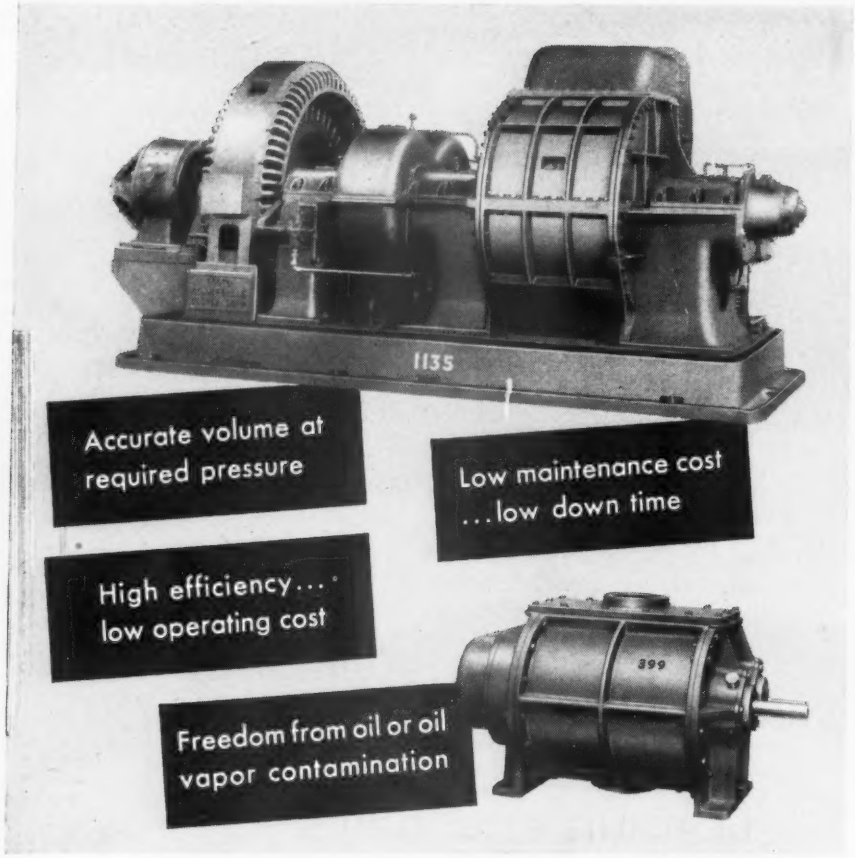
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(*Continued from page* 232)

Eastern Clay Products Department, International Minerals & Chemical Corp., Chicago, will describe the latest developments in "Pressure Molding." At a dinner meeting, Aaron Levenstein, Research Institute of America, will speak on "Human Relations—the New Dimension of Business." At the closing banquet, Frank Leahy, former head football coach at Notre Dame University, will be the guest speaker.—*M. W. Hollands, General Smelting Co. of Canada Ltd.*

Steel Founders' Fall Meeting

THE 52nd annual fall meeting of the Steel Founders' Society of America will be held Sept. 27-28 at the Greenbrier, White Sulphur Springs, W. Va.

The meeting, with President A. J. McDonald serving as chairman, will feature several important highlights. Everett Chapman, consulting engineer, West Chester, Pa., will present a talk entitled "Failure in Metals." Dr. Martin Gainsbrugh, chief economist, National Industrial Conference Board, New York, will discuss the current economic situation in a talk entitled "Appraisal of the Business Scene."

C. L. Harrell, president, Sterling Casting Co., East St. Louis, Ill., and chairman of the SFS Program Appraisal Committee, will report on the program of the committee and the report and its analysis is anticipated to set the course of action for the society for the next five or six years.

Presentation of annual safety awards, the society banquet, social hour, dancing, and a golf tournament are included in the program, which also contains organized entertainment for the ladies attending.

NFA 56th Annual Meeting

THE National Foundry Association will hold its 56th annual meeting Oct. 7-8 at the LaSalle Hotel, Chicago. The association, one of the oldest management groups in the country, has served the foundry industry since 1898.

Specialized subjects concerning labor and industrial relations, taxes as they affect the foundry industry, time study and incentive clauses in labor agreements and human relations will be discussed during the meeting. A panel discussion featuring representatives from large, medium and small foundries will treat at length individual approaches and preparation for collective bargaining negotiations.

Among a number of guest speakers will be J. P. Goedert, chairman, Sub-

committee on Long-range Planning of the American Institute of Accountants; Dr. Leo Wolman, director, National Bureau of Economic Research, and Phil Carroll, industrial engineering consultant.

On Oct. 6, officers and members of the NFA administrative council will meet to elect officers for the coming year. Present officers are W. Summerfield Brunk, president, Headford Bros. & Hitchins Foundry Co., Waterloo, Iowa, president; W. W. C. Ball, vice preseident, Taylor & Fenn Co., Hartford, Conn., vice president; and Frank J. Sherwin, president, Chicago Hardware Foundry Co., North Chicago, Ill., treasurer. Charles T. Sheehan is executive secretary of the association. Annual Alumni banquet of the association also will be held on Oct. 6.

Michigan Regional Conference

EXPANSION of the casting market, improvement of casting quality and reduction of casting cost through applied engineering will be the theme of the Michigan Regional Conference of the American Foundrymen's Society, to be held Oct. 14-15 at the University of Michigan, Ann Arbor, Mich.

Opening session will feature a general survey of the casting industry, and a talk on the future of castings in the automobile industry will highlight the initial luncheon. Technical sessions will review data on the most economical risering techniques, proper mold design with emphasis on gating, methods and economics of mold production, green sand pressure molding, shell molding, and permanent mold casting.

On the second day an open house will be held at the cast metals laboratory with lunch being served by the student members of the AFS Chapter. Following a look into the subject of careers in the casting industry and a review of cast metal research by the University of Michigan faculty, the conference will adjourn.

Kenneth H. Priestley, Vassar Electroloy Co., Vassar, Mich., is chairman of the general committee in charge of arrangements for the conference.

CEMA Issues Directory

Conveyor Equipment Manufacturers Association has released its annual directory of officers and directors, by-laws, committees, product groups and chairmen, representatives to other organizations, and complete roster of member companies. The association maintains offices at No. 1 Thomas Circle, Washington 5.

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FOUNDRY STATISTICS

MALLEABLE IRON

(Shipments of castings—net tons[1])

	Shipments—Total	Shipments—For Sale	Unfilled Orders[2]
1952	926,120	573,472	.....
1953			
May	82,050	48,011	160,387
5 mo.	446,218	268,028	.....
June	86,514	50,819	151,016
July	77,111	45,413	137,251
Aug.	73,855	45,415	120,801
Sept.	74,333	45,466	114,523
Oct.	73,473	45,515	104,046
Nov.	63,435	37,500	93,156
Dec.	72,126	39,657	95,612
Total	967,065	577,813	.....
1954			
Jan.	70,288	38,286	85,565
Feb.	69,078	37,792	81,579
Mar.	84,342	47,125	74,219
Apr.	74,515	39,102	69,094
May	67,856	37,306	67,040
5 mo.	356,079	199,591	.....

ALUMINUM

(Shipments of castings—1000 pounds)

	Shipments—Total	Sand	Perm. Mold	Die	Unfilled Orders[2]
1952	518,979	194,616	146,883	169,732	.....
1953					
May	57,340	19,639	16,528	20,858	137,065
5 mo.	288,918	96,219	86,031	105,212	.....
June	56,492	19,349	15,528	21,335	135,486
July	51,196	16,614	15,692	18,549	125,330
Aug.	50,428	15,940	16,252	17,837	126,781
Sept.	53,306	17,826	17,189	17,875	120,828
Oct.	55,097	17,171	17,030	20,547	115,189
Nov.	51,014	16,169	15,396	19,012	106,977
Dec.	51,571	15,265	16,907	18,963	105,980
Total	658,022	214,553	200,025	239,330	.....
1954					
Jan.	51,446	14,698	16,615	19,709	103,318
Feb.	51,213	14,696	17,281	18,754	96,011
Mar.	56,184	14,468	19,576	21,645	93,407
Apr.	53,006	14,073	18,091	20,366	91,853
May	47,708	12,461	16,357	18,368	83,803
5 mo.	259,557	70,396	87,920	98,842	.....

COPPER-BASE ALLOY

(Shipments of castings—1000 pounds[1])

	Shipments—Total	Sand	Perm. Mold	Unfilled Orders[2]
1952	1,009,910	910,862	63,865	.....
1953				
May	84,550	76,239	4,856	65,346
5 mo.	442,989	398,692	26,587	.....
June	83,947	75,625	4,705	62,843
July	69,957	63,365	3,927	60,381
Aug.	77,652	69,852	4,890	61,646
Sept.	79,595	71,184	5,273	57,209
Oct.	83,899	74,460	5,775	51,723
Nov.	74,782	66,370	5,077	48,842
Dec.	77,675	68,821	5,082	48,421
Total	990,496	888,369	61,316	.....
1954				
Jan.	71,437	63,034	4,618	42,351
Feb.	68,849	60,913	4,743	21,943
Mar.	76,480	67,952	5,123	38,417
Apr.	72,900	65,418	4,732	34,111
May	67,805	61,415	3,755	31,710
5 mo.	357,471	218,732	22,971	.....

MAGNESIUM

(Shipments of castings—1000 pounds[1])

	Shipments—Total	Shipments—For Sale	Unfilled Orders[2]
1952	34,857	32,977	.....
1953			
May	2,705	2,460	13,646
5 mo.	15,826	14,624	.....
June	3,063	2,679	13,756
July	2,287	2,079	13,927
Aug.	2,490	2,281	13,202
Sept.	2,455	2,238	12,528
Oct.	3,024	2,717	11,473
Nov.	2,681	2,417	10,612
Dec.	2,691	2,434	9,313
Total	34,517	31,469	.....
1954			
Jan.	2,451	2,149	8,800
Feb.	2,194	1,945	8,315
Mar.	2,407	2,109	7,698
Apr.	2,068	1,857	7,358
May	1,738	1,541	7,522
5 mo.	10,858	9,601	.....

PRODUCTION WORKERS

Estimated Number

(Thousands)

	Apr. 1954	Mar. 1954	Apr. 1953
Ferrous	194,300	195,000	229,800
Nonferrous	61,000	63,300	79,100

Average Weekly Earnings

	Apr. 1954	Mar. 1954	Apr. 1953
Gray Iron	$72.37	$71.42	$77.10
Malleable Iron	72.39	74.68	79.68
Steel	73.48	76.43	80.95
Nonferrous	78.01	79.00	80.56

Average Weekly Hours

	Apr. 1954	Mar. 1954	Apr. 1953
Gray Iron	38.7	38.4	41.9
Malleable Iron	37.9	39.1	41.5
Steel	37.3	38.6	41.3
Nonferrous	39.2	39.5	41.1

Labor Turnover Rate (Apr.)

(Per 100 employees)

	Total Accession	Total Separation	Quit	Layoff
Gray Iron	2.2	4.0	1.0	2.5
Malleable Iron	2.0	3.7	1.0	2.3
Steel	1.4	4.9	0.6	3.9
Nonferrous	1.9	8.5	0.9	7.1

Source: Bureau of Labor Statistics

GRAY IRON CASTINGS—SHIPMENTS

(Net tons[1])

	All Castings—Total	All Castings—For Sale	Miscellaneous Castings—Total	Miscellaneous Castings—For Sale	Heavy Steel Ingot Molds—Total	Heavy Steel Ingot Molds—For Sale	Chilled Railroad Car Wheels—Total	Pressure Pipe & Fittings—Total[3]	Soil Pipe & Fittings—Total[4]	Unfilled Orders[2]
1952	12,862,494	7,373,757	8,095,299	3,794,164	2,238,309	1,070,252	544,896	1,312,518	651,472	.....
1953										
May	1,185,545	641,581	734,326	312,836	238,202	115,728	41,373	113,136	58,508	1,271,711
5 mo.	6,024,917	3,228,900	3,786,651	1,623,725	1,216,063	582,972	220,469	535,208	276,526	.....
June	1,196,106	648,400	743,737	312,681	232,596	115,946	45,542	114,118	60,113	1,245,904
July	1,056,422	573,280	652,371	274,890	212,187	106,526	36,715	97,739	57,410	1,232,651
Aug.	1,069,392	588,543	646,902	286,449	217,930	107,428	40,327	107,805	56,428	1,222,612
Sept.	1,105,582	611,905	669,225	289,909	232,055	117,694	37,055	108,270	58,977	1,170,191
Oct.	1,141,526	650,229	669,757	300,249	245,966	124,177	41,917	118,306	65,580	1,075,538
Nov.	1,004,326	563,930	589,657	266,039	227,800	111,022	31,373	101,576	53,920	977,012
Dec.	1,032,444	552,565	634,250	274,203	228,532	108,700	30,051	94,053	45,558	954,885
Total	13,630,715	7,417,752	8,392,550	3,537,645	2,813,129	1,374,465	473,449	1,277,075	674,512	.....
1954										
Jan.	932,298	488,497	607,755	261,164	154,359	60,947	31,316	90,898	47,970	871,918
Feb.	936,364	491,983	607,085	252,591	156,933	70,261	29,240	92,546	50,560	865,344
Mar.	1,046,779	553,358	684,272	282,328	153,366	65,950	34,240	113,016	61,895	842,499
Apr.	995,052	528,027	657,126	263,147	126,083	56,114	29,075	116,420	66,348	826,491
May	943,335	516,475	605,385	247,623	122,839	57,106	27,144	124,714	63,253	775,278
5 mo.	4,853,828	2,578,540	3,161,623	1,306,853	713,580	310,378	151,015	537,594	290,016	.....

STEEL CASTINGS—SHIPMENTS

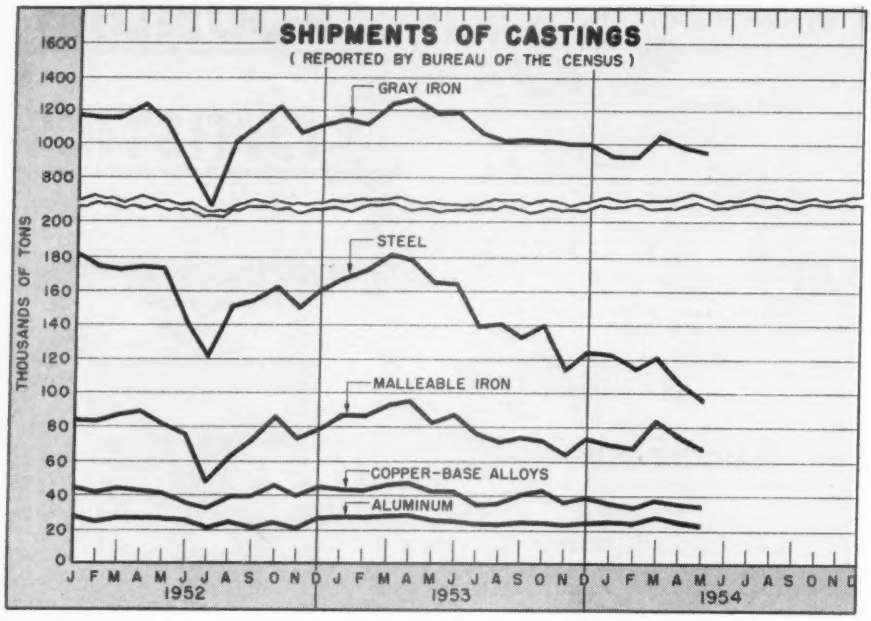
(Net tons[1])

	All Castings—Total	All Castings—For Sale	All Castings—Railway Specialties	Carbon Steel—Total	Carbon Steel—For Sale	Carbon Steel—Railway Specialties	Alloy Steel—Total	Alloy Steel—For Sale	Alloy Steel—Railway Specialties	Unfilled Orders[2]
1952	1,925,707	1,476,746	342,561	1,496,450	1,053,264	298,948	553,403	430,493	40,613	.....
1953										
May	165,649	126,380	29,552	117,318	88,781	26,888	48,331	38,036	2,664	328,931
5 mo.	870,331	672,715	158,257	615,877	472,493	144,488	254,464	202,876	13,769	.....
June	164,665	125,984	30,381	116,358	88,260	27,767	48,307	38,130	2,614	475,756
July	139,577	105,687	22,925	95,891	71,488	20,938	43,686	34,532	1,987	467,900
Aug.	141,340	107,941	25,026	97,076	73,784	22,637	44,264	35,003	2,389	418,927
Sept.	135,303	102,880	24,108	95,944	72,780	21,724	39,359	30,338	2,384	327,172
Oct.	140,702	106,788	25,354	100,568	76,118	23,449	40,134	30,988	1,905	313,684
Nov.	114,088	84,945	17,784	79,989	67,947	16,233	34,099	27,167	1,551	308,526
Dec.	123,281	91,017	18,685	86,465	62,377	16,998	36,674	29,952	1,687	278,389
Total	1,829,287	1,397,957	322,520	1,288,168	975,247	294,234	540,977	428,986	28,286	.....
1954										
Jan.	122,758	93,577	20,197	83,927	62,749	18,407	38,831	30,828	1,790	251,847
Feb.	116,520	88,699	17,938	81,433	60,638	15,961	35,087	28,061	1,967	234,634
Mar.	122,310	92,271	15,684	85,211	62,955	14,190	37,099	29,316	1,494	214,367
Apr.	105,788	78,754	11,031	72,118	52,389	9,538	33,670	26,365	1,493	197,857
May	94,610	70,596	9,454	64,546	46,651	8,342	30,064	23,945	1,112	182,502
5 mo.	561,986	423,897	74,304	387,235	285,382	66,438	174,751	138,515	7,856	.....

[1]Source: Bureau of Census. [2]For sale only. [3]All cast iron pipe is shipped for sale.

(Concluded on page 238)

FOUNDRY STATISTICS (Concluded from page 237)



INDEX OF FOUNDRY EQUIPMENT ORDERS

Foundry Trades Only

(Net Orders Closed, New Equipment)

	1953	1954
Jan.	99.6	173.8
Feb.	97.5	99.9
Mar.	132.2	82.7
Apr.	111.8	125.3
May	182.7	80.8
June	156.8	86.4
July	159.2	....
Aug.	236.3	....
Sept.	127.7	....
Oct.	87.2	....
Nov.	150.0	....
Dec.	161.2	....

Note: Figures are percentages of the base period 1947-49 taken as 100 per cent (monthly average). This is a new base period. Source: Foundry Equipment Manufacturers Association.

COKE PRODUCTION & CONSUMPTION

(Net tons)

	Production	Consumption Total	Consumption By Foundries
1952	68,254,109	67,865,639	3,102,446
1953			
May	6,824,810	6,752,823	272,673
5 mo.	33,114,468	33,326,215	1,306,635
June	6,625,223	6,692,864	254,830
July	6,748,229	6,654,080	217,504
Aug.	6,719,941	6,587,005	236,738
Sept.	6,404,143	6,330,441	236,119
Oct.	6,554,638	6,555,613	236,329
Nov.	6,208,155	6,039,813	216,837
Dec.	6,093,009	6,041,383	210,388
Total	78,467,806	78,227,414	2,915,420
1954			
Jan.	5,812,426	5,639,117	224,298
Feb.	4,889,717	4,920,651	211,114
Mar.	5,146,189	5,177,765	228,139
Apr.	4,693,036	4,569,843	212,272
May	4,800,761	4,655,466	206,925
5 mo.	25,342,129	24,962,842	1,082,748

INGOT BRASS & BRONZE

(Shipments in net tons)

	1953	1954
Jan.	24,423	20,661
Feb.	25,429	19,920
Mar.	28,256	23,653
Apr.	25,044	24,746
May	21,660	22,269
June	20,818	22,348
July	19,321	.....
Aug.	20,156	.....
Sept.	21,463	.....
Oct.	22,280	.....
Nov.	21,860	.....
Dec.	20,541	.....
Total for year	271,251	.....

ZINC-BASE ALLOY

(Shipments of castings—1000 pounds[1])

	Shipments—Totals	Shipments—For Sale	Unfilled Orders[2]
1952	408,353	282,673	.....
1953			
May	44,174	29,106	85,642
5 mo.	239,857	161,431	.....
June	48,806	31,010	88,533
July	38,968	24,829	83,508
Total	521,253	349,022	.....
1954			
Jan.	40,396	27,257	61,754
Feb.	37,660	24,112	55,351
Mar.	42,991	28,828	52,544
Apr.	38,968	25,211	51,388
May	36,793	23,669	46,726
5 mo.	196,808	129,077	.....

PIG IRON PRODUCTION AND CONSUMPTION

	Production** (Standard grades—net tons) Total	Foundry	Malleable	Basic	Low Phos. Intermediate Low Phos. & Bessemer	Consumption* (By type of furnace—gross tons) Total	Cupola	Air	Electric
1952	61,306,723	2,864,722	3,013,267	48,253,390	7,175,344	61,550,961	5,438,294	449,646	118,820
1953									
June	6,288,049	201,646	313,404	5,075,028	697,971	5,581,403	436,927	24,332	12,145
6 mo.	37,832,508	1,382,068	1,926,401	30,565,996	4,228,051	33,857,329	2,659,967	152,354	76,942
July	6,425,855	213,469	344,377	5,145,135	722,874	5,579,692	367,081	19,880	15,471
Aug.	6,381,056	202,116	310,717	5,167,059	701,164	5,672,037	385,003	20,829	14,206
Sept.	6,121,399	209,444	310,441	4,926,986	674,528	5,378,517	393,292	21,775	16,039
Oct.	6,409,245	218,880	290,882	5,175,064	724,479	5,733,466	395,066	21,349	13,206
Nov.	5,995,511	201,047	277,181	4,859,252	658,031	5,324,537	343,233	17,528	15,842
Dec.	5,712,937	172,283	276,432	4,625,524	638,698	5,091,786	374,838	18,596	12,561
Total	74,878,511	2,599,307	3,736,431	60,465,016	8,347,817	66,637,364	4,918,480	272,311	164,267
1954									
Jan.	5,531,137	184,629	294,691	4,510,870	540,947	4,933,282	362,576	17,620	14,578
Feb.	4,764,613	156,178	272,707	3,911,670	424,058	4,293,942	351,824	17,257	9,892
Mar.	4,907,147	213,249	243,356	3,977,137	473,405	4,367,814	390,929	21,369	13,112
Apr.	4,449,289	155,249	256,662	3,630,901	406,477	4,021,957	375,045	26,553	10,497
May	4,572,252	154,768	231,479	3,741,671	444,334	.....	.....	.....	.....
June	4,683,629	175,759	200,154	3,853,444	454,272	.....	.....	.....	.....
6 mo.	28,908,067	1,039,832	1,499,049	23,625,693	2,742,163	.....	.....	.....	.....

IRON AND STEEL SCRAP CONSUMPTION

(Gross tons*)

	All Scrap Total	All Scrap Purchased	By Types of Furnace: Cupola Total	Cupola Purchased	Air Total	Air Purchased	Electric Total	Electric Purchased
1952	61,625,549	30,520,946	9,154,146	4,752,497	1,053,233	395,591	8,015,064	5,190,833
1953								
Apr.	6,227,089	3,026,533	921,589	474,185	106,449	41,004	820,647	531,509
4 mo.	24,823,528	2,117,456	3,452,004	1,774,572	397,284	150,516	3,218,878	2,091,447
May	6,294,920	3,105,598	861,404	450,477	92,703	35,566	798,098	523,606
June	5,951,170	2,835,875	876,320	454,905	99,799	38,934	743,530	468,129
July	5,539,468	2,597,365	729,114	369,283	74,815	26,755	691,521	443,263
Aug.	5,637,759	2,614,153	753,272	390,741	77,047	28,167	678,968	428,332
Sept.	5,395,721	2,393,773	782,131	405,274	80,866	29,032	595,523	363,706
Oct.	5,628,568	.....	779,444	.....	75,618	.....	566,878	.....
Nov.	5,064,565	.....	687,498	.....	60,200	.....	477,666	.....
Dec.	4,690,277	.....	755,276	.....	68,002	.....	442,818	.....
Total	69,005,976	.....	9,676,463	.....	1,026,334	.....	8,263,880	.....
1954								
Jan.	4,574,384	.....	711,335	.....	71,202	.....	505,536	.....
Feb.	4,385,340	.....	704,535	.....	67,263	.....	462,095	.....
Mar.	4,637,573	.....	783,529	.....	82,337	.....	517,702	.....
Apr.	4,582,862	.....	748,766	.....	79,183	.....	518,048	.....
4 mo.	18,180,159	.....	2,948,165	.....	299,985	.....	2,003,381	.....

*Source: U. S. Dept. of Interior, Bureau of Mines. **Source: American Iron & Steel Institute. [1]Source: Bureau of the Census. [2]For sale only.

CUT STEEL

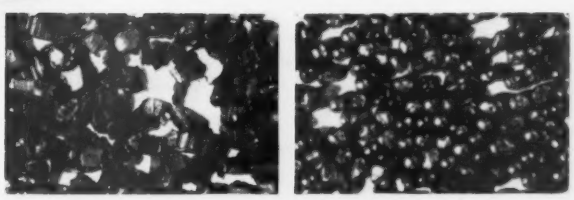
SLASHED OUR CLEANING COSTS AS MUCH AS 65% PER WHEEL-HOUR

The above cost analysis figure was included in a report recently received from a prominent manufacturer of farm equipment, one of the first users of Metal Blast's new CUT STEEL abrasive. The report also states that CUT STEEL produced a better finish than ever obtained before.

CUT STEEL is an entirely new type of abrasive. It is composed of small particles cut from high grade alloy steel. It work-hardens in use—actually becomes harder the longer it's used.

For scores of foundries, it is cleaning faster, better and lasting longer than any other abrasive. Yet, Grade "A" CUT STEEL costs *less than most cast steel shot,* and Grade "B" *no more than malleable shot.*

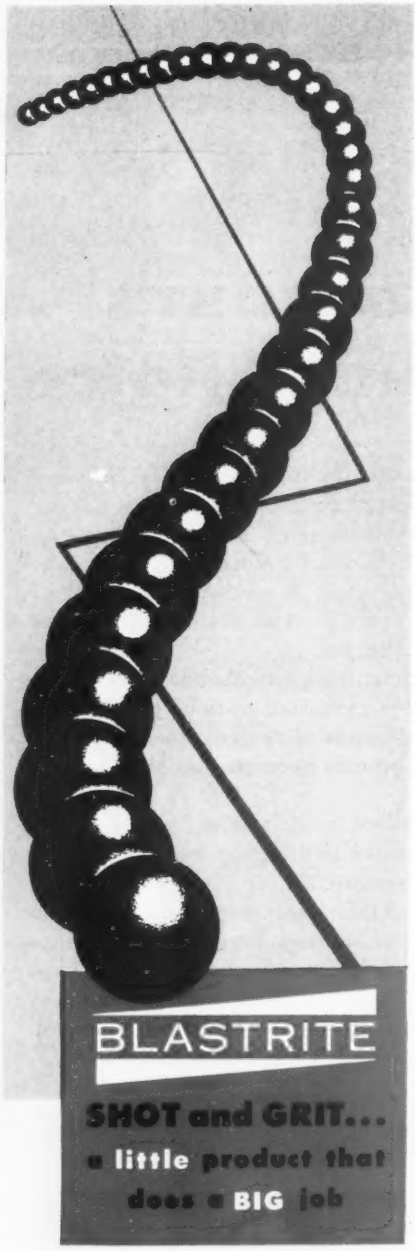
If you're concerned about cleaning costs and the appearance of your castings—by all means investigate CUT STEEL! Samples, literature, trial orders gladly, on request.



CUT STEEL changes shape in usage. Its original form is grit-like, with sharp edges and corners. But in production, it rapidly changes to a spherical shape, in a variety of sizes. The smaller pellets contribute to its efficiency by penetrating to even the hardest-to-reach parts of castings.

SOONER
OR LATER,
YOU TOO, WILL
CHANGE TO
CUT STEEL

METAL BLAST, Inc.
872 EAST 67th ST., CLEVELAND 3, OHIO
manufacturers of ANNEALSHOT, SUPER-ANNEALSHOT, CUT STEEL ABRASIVES



For high quality, longer wear, greater economy, specify Blastrite for your abrasive requirements. It comes in a complete range of standard sizes or in special, made-to-order sizes if needed for your particular operation.

Our new catalog No. AB-53 will give you further details.

ABRASIVE SHOT & GRIT CO., INC.

SPRINGVILLE, N. Y.
Telephone Springville 1

Fitting Worker to Job

(Continued from page 125)

years. Management has learned that optimum industrial efficiency, in the last analysis, depends on the effectiveness of the individual worker. Therefore an important part of occupational medical care should be the maintenance of the effectiveness of the individual—in other words, 'preventive industrial medicine.'"

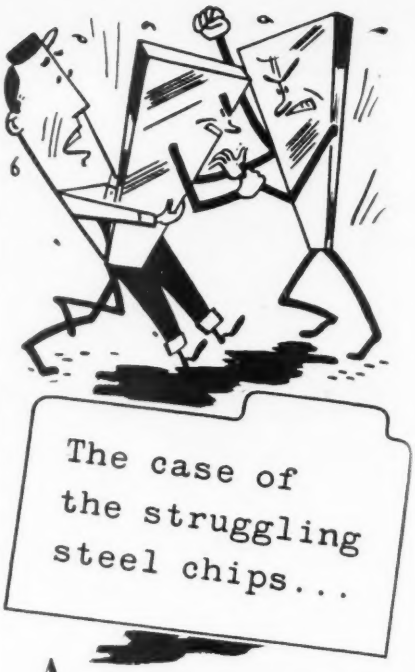
A key factor in preventive industrial medicine is a program of continuing medical examinations, with constant matching of human capacities against job demands. All American Brake Shoe workers are offered periodic medical checkups. One major purpose of regular examinations is to locate such maladies as incipient pulmonary disease, which does not usually cause disability until it is far advanced.

Besides the preplacement examinations for job applicants and the analysis of worker capability after absence due to sickness or accident, the program also offers each employee a chest x-ray at least once every year as part of the periodic examination. Workers in areas subject to potentially high concentrations of noxious dust or fumes are examined oftener. Besides chest x-rays, they may receive additional tests for lead intoxication and other occupational conditions which, fortunately, are now disappearing in foundries, thanks largely to modern industrial hygiene practices.

Use Mobile X-ray Unit

The annual chest x-ray surveys conducted at each of the company's plants are completed with the aid of a mobile unit similar to those used by county tuberculosis associations and fitted with the necessary equipment and personnel. When tuberculosis or indications of possible tuberculosis are discovered, the employee is asked to consult his own doctor or is referred to the local chest clinic for further medical care. Arrangements may be made by the plant industrial nurse for admission to a hospital. Where tuberculosis is considered quiescent, or a possibility of indeterminate activity exists, the worker may be permitted to continue working under supervision and observation. Recheck x-rays are taken every three to six months.

Thanks to these periodic x-rays, Dr. Hamlin explained, "We have found workers with minimal cases of tuberculosis who didn't know they were sick. Many infections have been caught in time to prevent later disabilities of much longer duration."



A Cleveland concern had a really perplexing problem of congested bins. No matter how the steel chips struggled to get through, the result was either a trickle or a complete jam-up.

As luck would have it, one of our men happened along and suggested a CLEVELAND vibrator be installed on the sloping side of the bin. It worked like a charm, and the steel chips struggled no more.

Ever think of a CLEVELAND vibrator for ***your*** *stubborn materials? Our detailed literature will tell you more about it.*

AIR *and* ELECTRIC

2788 Clinton Avenue • Cleveland 13, Ohio

In the case of workers located in potentially hazardous areas, the periodic examinations are correlated with a detailed industrial hygiene program. Air samples are taken frequently by the industrial hygiene department. When hazardous conditions are discovered, changes may be recommended in the working environment. Efficacy of this arrangement is shown clearly by the fact that no new cases of silicosis have developed at American Brake Shoe since 1942, when the present medical department was organized.

A feature of the job-placement medical program is a series of three colored cards, one of which is issued by the examining physician after every job applicant completes his physical examination. Purpose of the cards is to show the worker's physical ability to handle his proposed job, at the same time maintaining a confidential relationship concerning actual physical findings. The cards perform the same function for workers already on the payroll. For such workers, they reflect the results of examination after illness or accident of one of the periodic checkups.

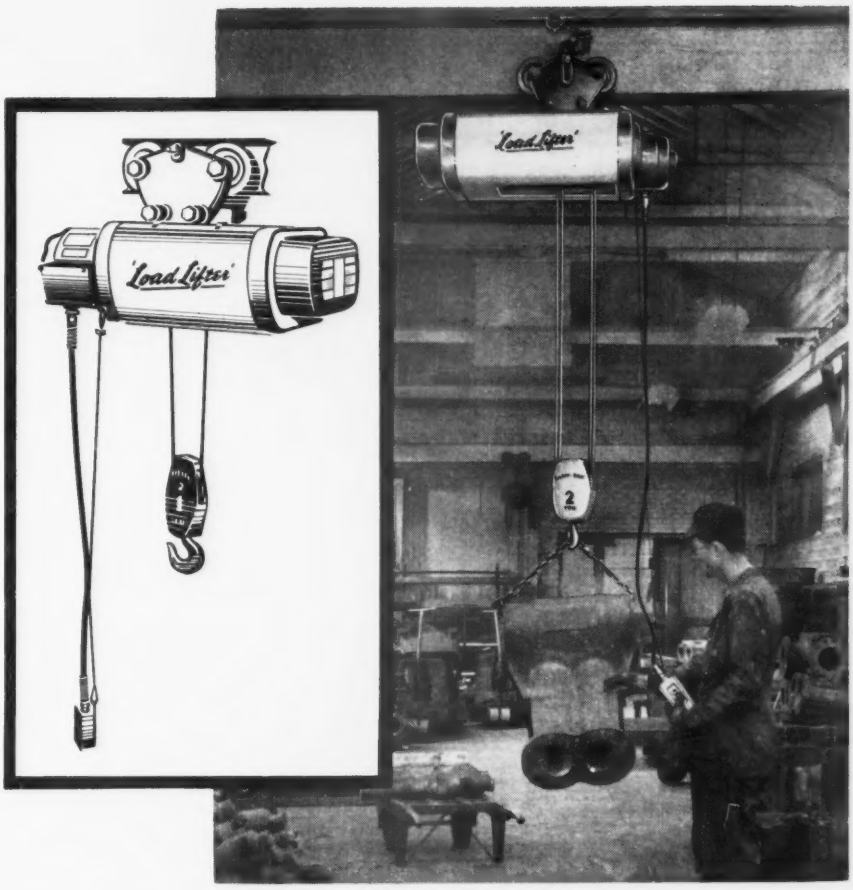
Two-Part Examination

The medical examination which precedes issuance of these cards to both prospective and already-hired employees consists of two parts. Part one of the pre-employment physical consists of questions regarding the individual's previous illnesses and family history, with special reference to tuberculosis, epilepsy, insanity, and heart disease; previous employment; and present medical complaints.

The position for which the applicant is being considered is also specified on this form, a white sheet of letterhead size, which then goes to the examining physician, who also fills out part two of the medical record.

For workers already on the payroll, another form is used to bring the record up to date on subsequent physicals. Typical entries, listed on a pink, letterhead-sized form, include "Symptoms or complaints since last examination," "Present state of health," "Are you under a doctor's care now?" and references to operations, accidents or serious illnesses not shown on previous records.

Part two of the record used for both groups consists of a comprehensive examination report by the company physician. A blue sheet of letterhead size reviews the various systems of the body, beginning with eyes, ears, nose and throat, and in-



HANDLE YOUR FRAGILE LOADS SAFELY . . .
Use the TWO-SPEED 'Load Lifter'®

Setting cores, drawing patterns, and closing flasks require a hoist with a slow, creeping speed that doesn't vary with the load. That's why the 2-speed Series "700" 'Load Lifter' Electric Hoist is so widely favored by foundry workers.

While the 2-speed 'Load Lifter' has a high that lifts a 2,000 lb. load half a foot per second, low speed is only one-third as fast. Push-button control gives fast, smooth control in lifting and lowering. Spotting is accurate, the load is protected, production costs are reduced.

The 'Load Lifter' has every safeguard for man, load, and hoist — steel suspension, non-fracturing load hook, strong, heat-treated helical gears, automatic load and motor brakes, and only 24-volts at the push button.

Minimize handling damage and spoilage. Put the high efficiency and convenience of the rugged 2-speed 'Load Lifter' Electric Hoist to work in your foundry. Capacities: ½ ton and up. Your "Shaw-Box" Distributor will gladly give you full details or write for Bulletin 399.

MAXWELL MANNING M&M MOORE INC. TRADE MARK

'Load Lifter'® ELECTRIC HOISTS

MANNING, MAXWELL & MOORE, INC.
MUSKEGON, MICHIGAN

Builders of "Shaw-Box" and 'Load Lifter' Cranes, 'Budgit' and 'Load Lifter' Hoists and other lifting specialties. Makers of 'Ashcroft' Gauges, 'Hancock' Valves, 'Consolidated' Safety and Relief Valves, 'American' Industrial Instruments, and Aircraft Products.

cluding an appraisal of skeletal structure, nervous system and mental capacity.

With both the blue and white forms in front of him in the case of job applicants, and blue and pink forms in the case of already-hired workers, the doctor has a detailed picture of the worker's physical capabilities. The doctor's knowledge of the job's requirements enables him to determine whether the worker is a "good," "fair" or "poor" risk for a particular position. Space for listing this conclusion is provided on the blue form.

After the examination, one of the three colored cards is sent to the personnel department. If a job applicant's card is green, the personnel director knows the applicant is capable of working at any job in the foundry. A yellow card will not necessarily prevent a worker from being hired, but the personnel director knows a conference with the doctor will be necessary before the applicant can be placed.

Red cards, issued when an applicant has failed to meet company medical standards, tell the personnel department that the man should not be hired. The plan provides for review by the company medical director. If re-examination of an employee already on the payroll reveals a change in his physical capabilities, a new colored card is issued. A yellow card means the worker is a "fair" risk for his job and should not be transferred without consultation with the plant physician, industrial nurse or the company medical director. A red card means the worker is a poor risk for his job and that consultation is necessary with the medical department. Regular employees remaining in the latter classification receive physical examinations annually, or more often.

"Say old boy—hear your son is following in your footsteps—taking up dentistry!"

A major test of any job-placement medical program is the industrial accident experience before and after its institution. At American Brake Shoe, in a typical year before establishment of the program, the accidental injury frequency rate (number of accidental injuries per million man-hours of exposure) usually was above 16. By 1951, the rate had dropped to 10.6. Between 1945 and 1952, the accidental injury severity rate (man-days lost per disabling injury) declined from 1.030 to 0.512.

It is obvious from these statistics that the job-placement medical program at American Brake Shoe Co. has made a valuable contribution to industrial safety.

Starts Production of Investment Castings

Pacific Coast Division of Howard Foundry Co., Chicago, recently poured the first heat at its new lost wax precision investment casting foundry in Los Angeles. The foundry, located at 1860 East Gage Ave., has completed pilot runs and now is ready to produce precision castings. Approximately 100 people will be employed when the plant reaches full production early next year. Howard Foundry also operates an investment casting foundry in Milwaukee in addition to four foundries in Chicago.

PRECISION CASTING MOLDS

Are Made from Master Pattern

PRECISION casting process developed by Shaw Processes Ltd., London, England, differs from the lost wax process in that no wax or other expendable patterns are employed. Accurate molds are produced directly from master patterns. The pattern incorporates necessary allowances for metal shrinkage only, the final mold cavity being exactly the same size as the pattern. To insure maximum accuracy, the pattern is not split. It is invested one section at a time with a liquid setting material of the plaster of Paris type.

High accuracy and smooth surface finish are obtained in castings because of the unusual properties of the mold material. It is prepared in a slurry comprised of a suitably graded refractory filler and a colloidal suspension of silica in alcohol to which a reagent has been added to produce a carefully controlled gelling reaction. The liquid portion of the slurry is produced by the controlled hydrolysis of ethyl silicate. The reaction converting this slurry to a tough, rubbery gel can be represented by this equation:

$$Si(OC_2H_5) + 4H_2O = Si(OH)_4 + 4C_2H_5OH$$

As the gelling process progresses, the mold slurry solidifies, passing through a tough, rubberlike phase. In a rubbery condition, the mold is stripped from the pattern, which can be used with no draw and in some cases with a slight undercut.

Reference to the equation above shows that a product of the reaction is alcohol. Mold pieces in the rubberlike condition are fired rapidly by ignition of the alcohol. Whereas a solid mass of gel allowed to "dry" slowly would shrink and distort, the rapid removal of alcohol by rapid firing gives rise to a mold surface which is covered by a fine system of craze-cracking. This crazing is progressive.

The surface system of cracks provides an outlet for the alcohol beneath the surface. Volume change in the gel arising from the removal of the alcohol is accommodated by the system of cracks producing a mold cavity of exactly the same dimension as the pattern. Surface cracks are so fine, however, that no metal penetration occurs when the mold is poured.

A further advantage of the crazed mold structure is that it is very permeable and requires no artificial venting. The mold also is immune to thermal shock since each discrete refractory particle is surrounded by fine cracks which accommodate expansion. When the design of the casting requires a hot mold, so that fine detail can be reproduced, the cold mold can be placed directly in a hot mold heating oven without any risk of mold damage by cracking or spalling of the surface.

After firing, the mold sections are assembled and clamped and are cemented together with a thick, quick-setting refractory slurry that is poured around it. The cementing material is fired by ignition of the binder liquid, and the mold is complete.

Castings can be made by the process in any metal or alloy that is castable by ordinary foundry processes. Steel castings weighing up to 300 lb have been cast. Parts up to 3 in. long can be cast to tolerances of 0.005-in. per inch, with a minimum tolerance of 0.003-in. On dimensions over 3 in., an over-all tolerance of 0.005-in. can be held.

Editor's note: The above was condensed from a paper presented before the Scottish branch of the Institute of British Foundrymen by Adam Dunlop, director, Clino Foundry Supplies Ltd., Newcastle-on-Tyne, England.

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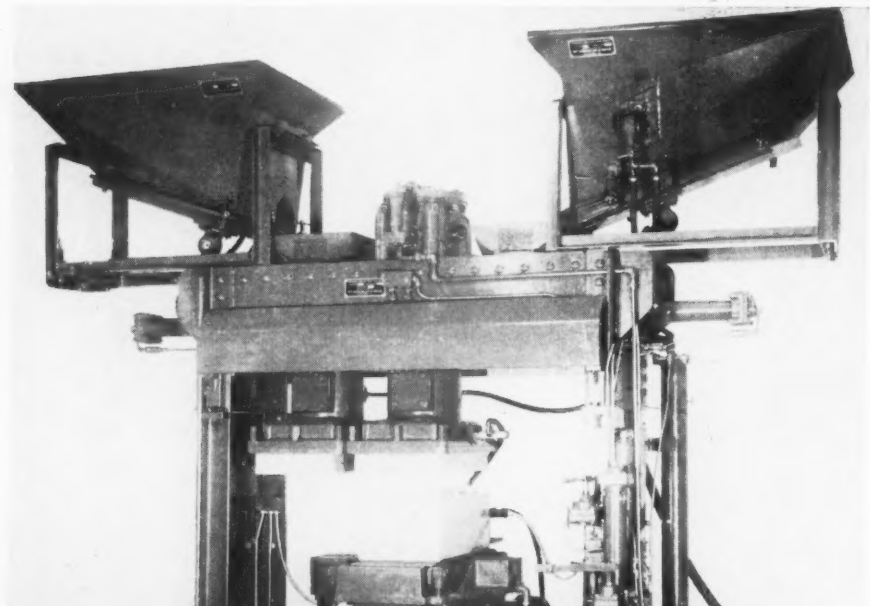


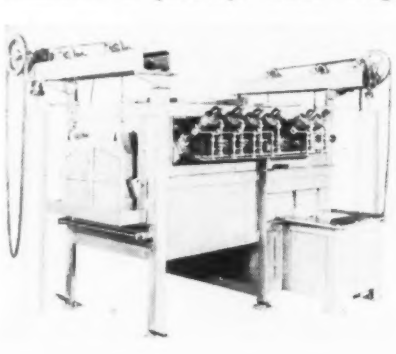
Core Blower: Wm. Demmler & Bros., Kewanee, Ill.—Twin magazine core blower with capacity of more than 360 cores per hour is designed to blow right and left hand cores consecutively. Machine works equally well blowing two entirely different cores, according to the manufacturer. Each core can be blown of its own special sand mix as machine is equipped with two automatic vibratory sand feeders. The idle sand magazine is filled while the other is in blowing position. The 17-in. table cylinder has a 10-in. draw stroke of which all or any part can be used. The draw post and all valves and controls are enclosed and protected from sand abrasion. Push-button, automatic or semiautomatic controls are standard equipment.

For More Details Circle No. 1—Page 247

Precoating Process: Bakelite Co., Division, Union Carbide & Carbon Corp., 260 Madison Ave., New York 16, N. Y.—Savings up to 50 per cent in shell mold resin content are claimed for process of precoating sand with phenolic resins. Process assertedly makes possible high green strength, good shell mold bond strength, and smooth coating surfaces. Each sand particle is coated with a thin layer of resin to provide fast melt, flow and bond. As the resin is stable and non-heat-reactive, the sand can be coated without danger of hardening prior to the production heating cycle. A cataylst in aqueous solution, which is added after the sand is coated, brings about the reaction which hardens the resin to bond the sand layer in the shape of the casting mold. Shorter production cycles are said to result from the fast curing time as well as a 25 per cent reduction in dwell time.

For More Details Circle No. 2—Page 247

Melting Furnace: Eclipse Fuel Engineering Co., 1002 Buchanan St., Rockford, Ill.—Dry hearth double-chamber melting furnace is for melting, die casting, or permanent molding of aluminum parts requiring a minimum of porosity. Basic design consists of separate melting and holding baths in a single unit to eliminate use of containers. Furnace assertedly has a high melting rate and uniform pouring temperature. Twelve standard sizes are available with capacities up to 2000 lb per hr for gas, oil, or combination gas-oil firing. Dip vestibules may be arranged for end, single-side, or double-side dip out.



For More Details Circle No. 3—Page 247

V-Belt Drive: Manhattan Rubber Division, Raybestos-Manhattan Inc., Passaic, N. J.—V-belt drive, consisting of a single endless rubber belt with a series of parallel V ribs molded lengthwise around the inside circumference, has an uninterrupted, high-strength member of synthetic cords across its entire width. The grooves are designed to mate with the belt ribs, and since the belt covers the full width of the drive member, the load is distributed equally over the entire driving surface, providing twice the contact area of a comparable multiple V-belt application. This arrangement reduces face pressure one-half, giving longer life to belt and sheaves. The belts are available in two sizes to meet all drive requirements from 3 in. pitch diam sheaves and 50 in. belt pitch lengths upwards.

For More Details Circle No. 4—Page 247

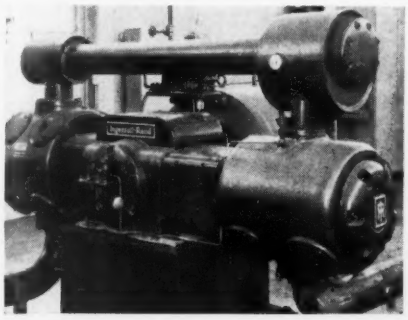
Flexible Grinding Wheel: Merit Products Inc., 4023 Irving Place, Culver City, Calif.—Multiple wheel units mounted together to form a single broad wheel can be attached to a flexible shaft, portable drill or fixed installation to provide a flexible grinding wheel for use in finishing metals, deburring, flash removal, and removing scratches, mars, and tool marks. Because of its ability to flex, it follows irregular contours and provides a smooth, uniform abrasive action without digging into the material. Manufacturer recommends use of three to five wheels for best results on non-fixed installations but any number of the light-weight wheels can be

For More Details On These Items
Use Reply Card—Page 247

used in increments of 1 in. for fixed installations. Wheels weigh about 7 oz each.

For More Details Circle No. 5—Page 247

Air Compressor: Ingersoll-Rand Co., 11 Broadway, New York 4, N. Y.—Opposed-cylinder, balanced design air compressor in the 75-100 hp range



is driven by a direct-connected, induction motor. Unit is a packaged, ready-to-run, heavy-duty unit, arranged in single or multi-stages. It requires little floor space, a simple foundation, and a minimum of piping and connections. Manufacturer claims it is suitable for foundries, factories, mines and powerhouses.

For More Details Circle No. 6—Page 247

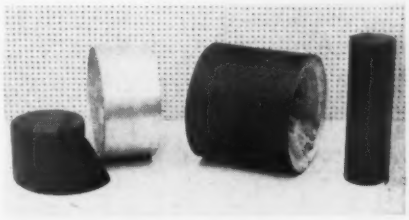
Carbide Deoxidizers: Electro Refractories & Abrasives Corp., 344 Delaware Ave., Buffalo 2, N. Y.—Company has added a line of silicon carbide deoxidizers for both open hearth and electric furnace practices. Different grain sizes are available to help purify molten metal. In use, the silicon carbide is broken down by the hot metal into specially reactive forms of silicon and carbon. These combine with minor amounts of metallic oxides and other impurities to remove them as part of the slag or as gases. The deoxidizer is shipped in paper bags holding 25 lb. The entire bag may be dropped in the melt since its special paper will not add deleterious elements.

For More Details Circle No. 7—Page 247

Recording Controllers: General Electric Co., Schenectary 5, N. Y.—Line of process instruments, including potentiometric and alternating current bridge recorders and recording controllers, are designed for continuous measurement and control uninterrupted by periodic standardization. The instruments incorporate new measurement circuitry and components, featuring a magnetic standard in the potentiometric system and a bridge balancing unit in the alternating current bridge system. Both models are available with either electric or pneumatic control and contain a centerless pointer to simplify chart changing while leaving nearly all of the chart exposed to view for easy reading. Chart speeds are 1, 4, 8, 12, and 24 hr and 7 days. The units use a 120-v, 60-c power supply.

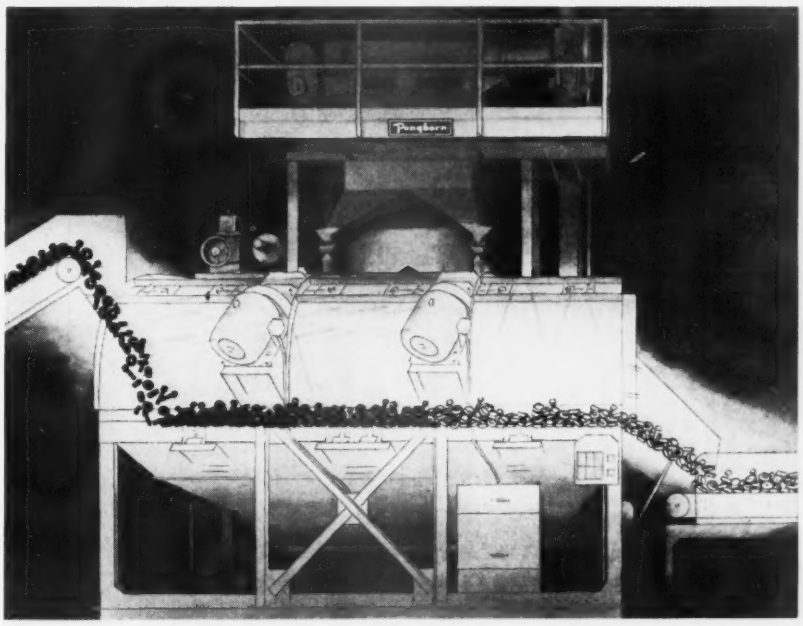
For More Details Circle No. 8—Page 247

Non-Slip Surface: Minnesota Mining & Mfg. Co., 900 Fauquier St., St. Paul 6, Minn.—Waterproof, nonslip surfacing with a mineral coating of traprock has been developed for pulley lagging. The surfacing is a thin, tough fabric said



to be flexible enough for use on any type of industrial pulley. It can be spiral-wound or applied in sections. Manufacturer claims it avoids any harsh abrasive action on belts or belt lacings, but is aggressive enough

Barrels Feature High Cleaning Capacity

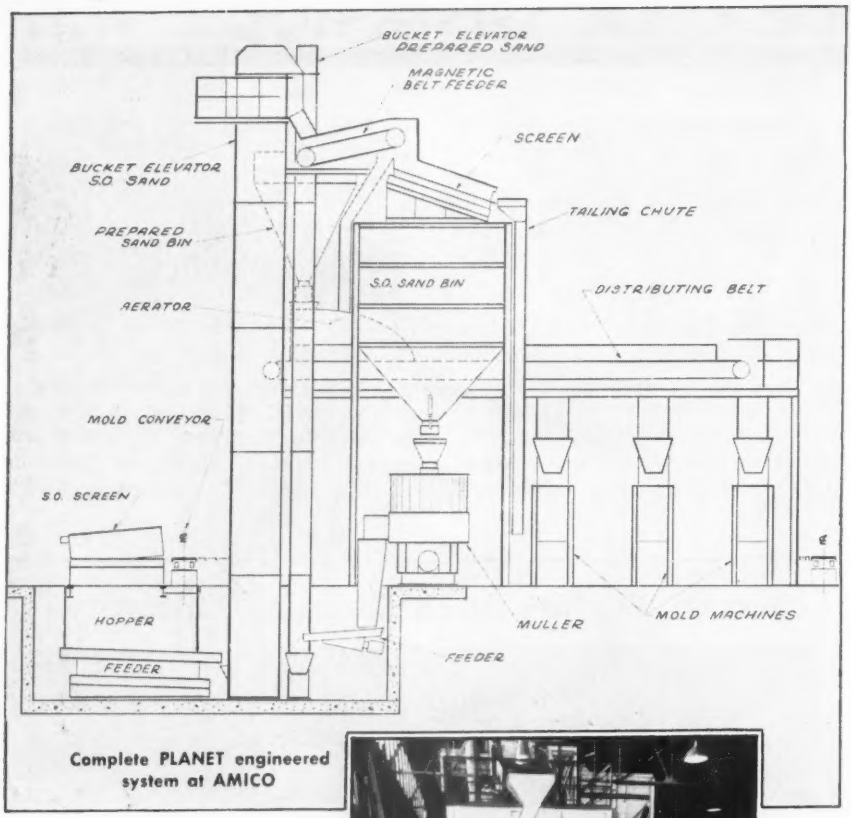


FIVE cleaning barrels ranging from 48 to 72 in. in diameter are suited for foundry appl cations to provide maximum amount of automatic operation. Barrels are installed so that conveyors bring castings from shakeout and cooling conveyor directly into the barrel, where they are continuously moved through while being tumbled and blast cleaned. For maximum economy the barrels are best suited to heavy volume cleaning operations, according to the manufacturer.

All abrasive is reclaimed before cleaned castings are discharged from barrel, either onto a conveyor or into tote boxes. Barrels are equipped with abrasive reclaiming systems which thoroughly clean the abrasive for reuse, retaining full blasting efficiency, discarding all fines and refuse.

Because of the numerous variations possible in shape and size of castings or forgings, the cleaning is usually rated in cu ft per hr cleaned. The maximum dimension of castings or forgings that can be cleaned in the barrels ranges from 11 in. in the 48-in. diam barrel to 26 in. in the 72 in. diam barrel. The 48-in. barrel has a cleaning capacity of 50-60 cu ft of gray iron castings or 30-40 cu ft of forgings per hour while the 72-in. barrel has a cleaning capacity of 300-400 cu ft of gray iron castings or 150-200 cu ft of forgings per hour. Other barrels have capacities proportionate to their sizes. Manufacturer is Pangborn Corp., 1400 Pangborn Blvd., Hagerstown, Md.

For More Details Circle No. 9—Page 247



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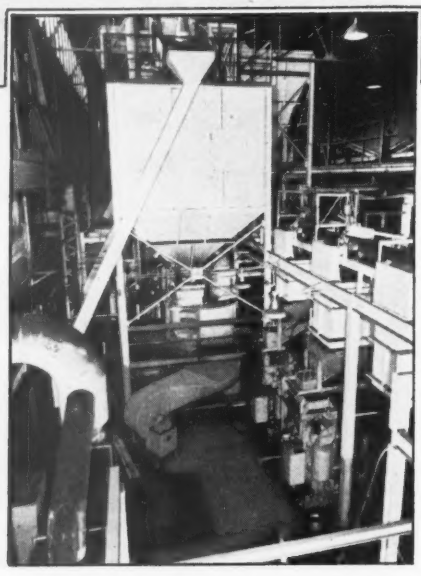

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PLANET manufactured components include a 150-ton sand bin, sand preparation system, sand distributing conveyor, hoppers, mold conveyor, overhead pouring rails, shake-out and return sand system.

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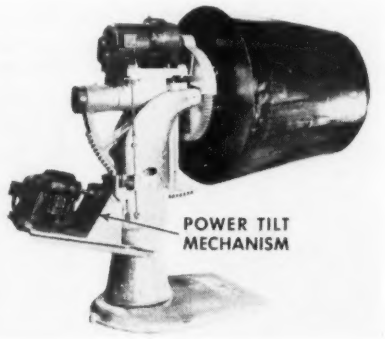
to provide the required traction. I is fire-retardant and resistant to oil grease and water. It is available i rolls up to 24 in. wide.

For More Details Circle No. 10—Page 247

Power Tilt: Globe Stamping Di vision, Hupp Corp., 1250 West 76th St., Cleveland 2, O.—Use of power tilting device on direct drive tum-



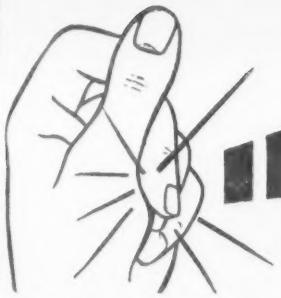
bling barrels is said to achieve uniform tumbling angles, reduced operator fatigue, and a 20 per cent saving of floor space. The tilting mechanism is controlled by a reversing drum-type switch. The unit is designed for manual starting, with automatic shut-off at adjustable high and low limits, at rated capacities up to 3000 lb. A 1/3 or ¾ hp gear motor is used to power the unit at a shaft speed of 48 rpm, providing a limit-to-limit tilt speed (loaded) of 20 to 30 seconds, depending upon the size of the barrel.

For More Details Circle No. 11—Page 247

Tire: Mitchell Industrial Tire Co., 1400 E. 40th St., P. O. Box 468, Chattanooga, Tenn.—Industrial tire has no tube, eliminating punctures

and blowouts. Tire is constructed of rubber and fabric pads fastened together under extreme pressure with an internal steel core to form a resilient tire with caterpillar tread

(*Continued on page* 249)



IDEAS FOR FOUNDRYMEN

HERE ARE QUICK REVIEWS OF NEW LITERATURE—available to foundrymen as "idea" and reference information. Readers in the United States and Canada may obtain copies by using the attached cards. Readers in foreign countries should write direct to the manufacturer offering literature.

81. Grinding Machinery

Standard Electrical Tool Co., Foundry Grinder Div., 2000 River Rd., Cincinnati 4, O.—"Before and After" photographs of old and new foundry grinding installations make up greater part of 4-page illustrated bulletin 214. Infinitely variable speed snagging grinders with up to 30-in. diameter wheels are shown.

82. Wear Plates

A. I. C. Engineering Co., P. O. Box 6351, 42nd St. Station, Indianapolis, Ind.—Rubber trunnion-head wear plates for tumble-type shot cleaning equipment are covered in single-page data sheet. They can be replaced in approximately 3 minutes, since actual wear surface is interchangeable.

83. Vibrating Conveyors

Stephens-Adamson Mfg. Co., Aurora, Ill.—8-page illustrated bulletin 353 presents engineering and application data on natural frequency vibrating conveyors. They are made in balanced vibration and standard and low-headroom types. Units can be furnished with screening decks.

84. Corebox Vents

C. M. Smillie & Co., 1100 Woodward Heights Blvd., Ferndale 20, Mich.—Close-tolerance corebox air release vents are described in 4-page pamphlet. Sizes from ⅛ to 1¼-in. diameter are available in 1/16-in. increments.

85. Air & Hydraulic Cylinders

Miller Fluid Power Co., 2040 N. Hawthorne, Melrose Park, Ill.—Piston rod diameters needed on air and hydraulic cylinders with long-push strokes on long piston rods are listed on 2-page data sheet 251. Pressure and flow charts, pipe size chart and other data are also included.

86. Core Binder

Reichhold Chemicals Inc., 525 N. Broadway, White Plains, N. Y.—Foundrez 7990 dual-purpose core binder is described in 3-page technical bulletin F-4. Composition, characteristics, advantages, methods of use and baking features are discussed.

87. Cleveland Foundries

Beardsley & Piper Div., Pettibone Mulliken Corp., 2424 N. Cicero Ave., Chicago, Ill. —May, 1954 convention issue of "Better Methods" puts a pictorial spotlight on outstanding foundries in and around Cleveland. Mulling, sandslinging, and other sand preparation machinery is shown.

88. pH Electrometer

Coleman Instruments Inc., 318 Madison St., Maywood, Ill.—Model 18 alternating current pH electrometer is subject of descriptive 4-page bulletin B-221. Instrument yields accurate and reproducible measurements to within 0.05-pH. Accessories and replacement parts as well as Coleman buffer tablets are described.

89. Foundry Equipment

Newcomb Industries, Ltd., 1200 London St. W., Windsor, Ont.—Illustrated general products catalog contains 4 pages showing such items of foundry equipment as ovens, spray booths, parts washers and dust collectors. Capsule specifications are given.

90. Furnaces & Ovens

Claude S. Gordon Co., 3000 S. Wallace St., Chicago 20, Ill.—Blue M electric ovens, furnaces and related equipment are covered in 4-page illustrated catalog 1153. Furnaces are available with operating temperatures up to 1090° C. General data, specifications and prices are given, and features are explained.

91. Shell Molding Resins

Bakelite Co., 30 E. 42nd St., New York 17, N. Y.—Fundamentals of the shell molding process are illustrated and discussed in 10 steps, from the initial mixture preparation of mold to finished casting, in 20-page brochure C-8.

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92. Waste Water Clarification

Eimco Corp., Process Div., 301 S. Hicks Rd., Palatine, Ill.—The Eimco system of foundry water clarification, combining chemical flocculation, sedimentation and solids concentration, is described in question and answer form in 4-page bulletin F2034C. Diagram of system is highlight.

93. Corebox Vents

Andrea Mfg. Co., 180 N. Wacker Drive, Chicago 6, Ill.—Size and price data on deep and shallow-head slotted vents for core boxes are given in small folder.

94. Core Binder

Delta Oil Products Co., Milwaukee 9, Wis.—Instructions for the use and application of Delta Dri-Bond core binder are offered in 4-page folder. Three tests which point up binder's fast baking qualities are given.

95. Melting & Casting

Foundry Services Inc., 260 Madison Ave., New York 16, N. Y.—"Melting and Casting" is title of 56-page plastic-bound booklet which provides description, advantages, directions for use, grades and quantities to use and other pertinent information on Foseco products for casting aluminum and its alloys; magnesium and zinc; brass, bronze, copper and nickel alloys; iron and steel; and other ferrous and nonferrous metals.

96. Foundry Sand Core Washes

National Lead Co., Titanium Alloy Mfg. Div., 111 Broadway, New York 6, N. Y.—Tam Zirconite sand, flour and mold and core wash are products described as to use, advantages and properties in 12-page illustrated brochure.

97. Metal Melting Furnaces

Stroman Furnace & Engineering Co., 9900 Franklin Ave., Franklin Park, Ill.—Metal furnaces described and illustrated in 20-page bulletin 800 include stationary and tilting crucibles, tilting and stationary units for aluminum and other white metals, furnaces for brass and iron, smelters furnaces and die casting aluminum furnaces. Skip hoists, core ovens, burners, pumps and blowers are also covered.

98. Pallets & Pallet Boxes

Wood Fabricating Co. 3760 Wyoming, Dearborn, Mich.—Wooden pallet boxes and dunnage are described as to their use and practicability in 4-page folder. Hardwood permanent pallets and lightweight expendable types are covered. Dunnage is prefabricated lumber cut to size and specifications.

99. Dry Core Binder

E. F. Houghton & Co., 303 W. Lehigh Ave., Philadelphia 33, Pa.—Hy-Ten dry core binder No. 100 for nonferrous casting is subject of descriptive 4-page folder 2-294. Product's merits along with some case histories of its use are pointed up.

100. Foundry Equiqment

Sterling Wheelbarrow Co., Milwaukee 14, Wis.—58 illustrated pages make up this Golden Anniversary foundry equipment and supplies catalog No. 66. Flasks, flask accessories, wheelbarrows, carts and trucks are represented. Specifications and design data are given for each piece of equipment shown.

101. Automatic Sand Plow

Factory Specialty Corp., Detroit 7, Mich.—Proto Plow proportioning automatic plow for filling bins is gravity powered. Attendance and maintenance are unnecessary, and system prevents overfilling of bins while preventing sand from going over the head pulley. System is described in detail in 4-page illustrated catalog.

102. Pots & Ingot Molds

Acme Foundry Co., 2503 22nd St., Detroit 16, Mich.—Made from heat-resisting iron, pots for melting nonferrous metals, die cast pots and ingot molds are covered on illustrated data sheet. Attached drawing shows details of standard ingot mold.

IMPORTANT READING FOR FOUNDRYMEN

We have a limited quantity of the following reprints which we can furnish while they last.

103. Al-Ni Bronze Castings

Melting equipment, raw materials, melting procedures, temperature control, pouring practices, mold materials, heads and risers and gating are among technical considerations for "Production of Aluminum - Nickel Bronze Sand Castings" discussed in reprinted article of same name. FOUNDRY article is by Vincent DePierre and Richard C. Wynne of U. S. Naval Gun Factory.

104. Coke & Carbon Pickup

Tests intended to evaluate the behavior of coke in the cupola, particularly with regard to its carburization or the facility with which the carbon passes into solution in molten iron, is subject of FOUNDRY reprint by C. R. Austin of Meehanite Metal Corp. Many data are in graph and table form.

105. Foundry Conveyor Belting

"How to Specify, Install and Care for Conveyor Belting in the Foundry" is a series of three reprinted FOUNDRY articles. Considerations for normal and high temperature service requirements, speeds, how to splice, keeping wear to a minimum and suggested preventive maintenance are among subject matter. Author is Robert H. Herrmann, associate editor.

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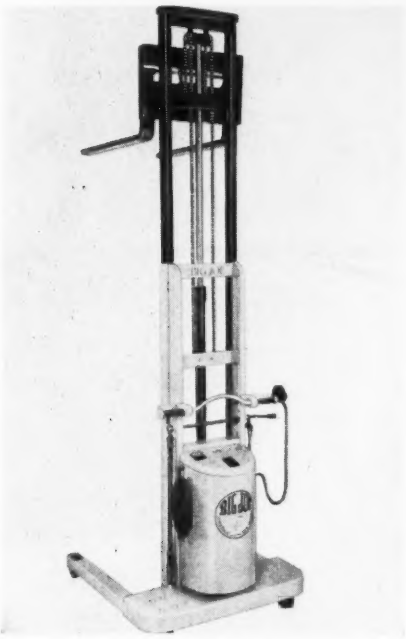
(*Continued from page* 246)
which is claimed to provide traction, high load capacity, easy and accurate steering. The tire is available in all popular sizes.

For More Details Circle No. 12—Page 247

Telescopic Lift: Big Joe Mfg. Co., 900 West Jackson Blvd., Chicago 7, Ill.—Telescopic hydraulic lift is battery operated and pro-



vides a stacking height of 110 in. This lift, like others in the company's line, is specifically designed for "in-between handling" which, according to the manufacturer, is the short distance manipulation of materials too heavy for manual handling yet not requiring heavy-duty, power-driven equipment.

For More Details Circle No. 13—Page 247

Respirator Filter: American Optical Co., Southbridge, Mass.—Filter protects industrial and laboratory workers against air-borne particles including the hard-to-handle 0.3 micron size. The filter removes air-borne radioactive matter and other toxic dust, mist and fumes. It also protects against spores, viruses, bacteria, fungi, and such compounds as beryllium, selenium, arsenic, thallium, uranium, cadmium, thorium, palladium, platinum, phosphorus and chromium. Each unit is contained in a lightweight aluminum cartridge which both protects the filter while in use and eliminates possibility of damage in installation.

For More Details Circle No. 14—Page 247

Potentiometer: Wheelco Instruments Division, Barber-Colman Co., Rockford, Ill.—Portable potentiometer offers flexibility for checking and calibrating temperature measurement and control instru-

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While we have just about every size and type of chaplet you can think of, there is a *possibility* that we don't have the *exact type* you require. In that case, we can design and develop *just the chaplet* to suit your requirements! We have all sorts of working samples available, and are always ready to ship them in a hurry to those who wish to try them.

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- CORE TINS & SHIMS
- TAPER DRIVE PLUGS

Crescent FUSETITE CHAPLETS are accurately made of proper analysis materials for the fusing-in process. We have been devising and supplying chaplets since 1889, and our stocks are amazingly ample and varied. We originated Radiator, Shoulder, Double Head and Motor Chaplets, and if necessary, we can originate Special Chaplets for YOU.

WRITE FOR SAMPLES AND PRICE LIST

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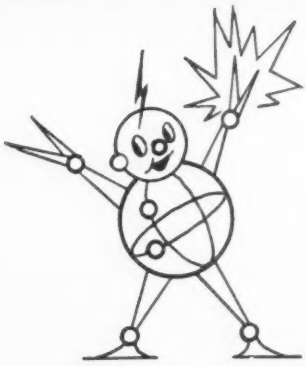
CRESCENT BRASS & PIN CO.
5766 TRUMBULL AVE. DETROIT 8, MICHIGAN



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Lithium has long been established in metallurgy as a degasifier, deoxidizer, desulfurizer and general purifying agent. As a degasifier of Nickel Bronze, Lithium makes possible a dense, fine-grained metal.

A small slug (2¼ grams) of metallic Lithium added to a charge of molten copper or copper alloy eliminates entrapped oxides and gases. Tensile strength and elongation are increased, porosity decreased, and grain size reduced. Characteristic low density causes the lithium products formed to float to the surface where they are easily removed as slag. By adding Lithium the surer way—in the handier *cartridge* form—you eliminate the "by-guess-and-by-gosh" formulation too common with less satisfactory methods.

Lithium Cartridges will give you an improved, more uniform casting with better electrical conductivity, with less trouble and at less cost. The small amounts required put both the economics and technique of Lithium within your reach. Hermetically sealed in copper tubing with easily removed plastic-sealed ends, four sizes—2.25, 4.50, 9.0 and 108.0 grams—are available.

Investigate Lithium Cartridges. Write for details on actual foundry tests.

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Plants:
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Mines:
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ments. Unit is suited for laboratory work as well as for maintenance and service work in plant or field. It may be used with all commercial thermocouples. Large 40-in. scale is readable to 0.025 millivolts. Built-in thermometer facilitates measuring cold junction temperatures. Six models are available.

For More Details Circle No. 15—Page 247

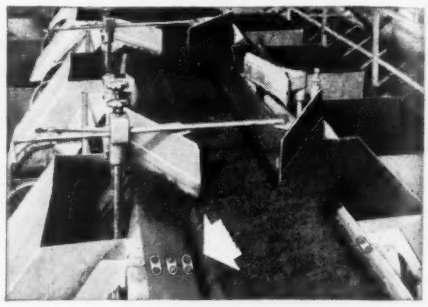
Vacuum Cleaner: U. S. Hoffman Machinery Corp., Air Appliance Division, 105 Fourth Ave., New York, N. Y.—Portable vacuum cleaner is designed to operate two 50-ft 1½-in. hoses simultaneously, or one 75-ft length of 1½-in. hose. The cleaner has a large dust bucket and is equipped with an exhauster and motor which produce 6½-in. Hg suction. The cleaner is said to operate with little vibration or noise because of dynamically and statically balanced impellers in the exhauster.

For More Details Circle No. 16—Page 247

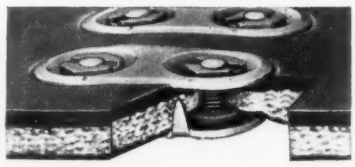
Warning Light: Federal Sign & Signal Corp., 8700 South State St., Chicago 19, Ill.—Electric signal light has use as a warning device in industry to indicate hazardous work areas, or as a visual communications light in noisy shops, or over long distances. Colored light beam revolves horizontally in a 360-degree arc and produces 100 brilliant flashes

NEW!
Developed Especially for FOUNDRIES

FLEXCO SCRAPER PLATES



FOR JOINING CONVEYOR BELTS WHERE SCRAPERS AND PLOWS ARE USED



- Especially designed for use in joining foundry conveyor belts.
- Beveled top plates ride snug to belt eliminating interference with plowing and scraping operations.
- Thoroughly tested . . . by several large foundries . . . for four years.
- One size . . . for joining belts 5/16" to 1/2" thick with not more than 500 ft. centers.
- Available in Steel, Monel and Everdur.

Ask for Bulletin F-108

Order From Your Supply House

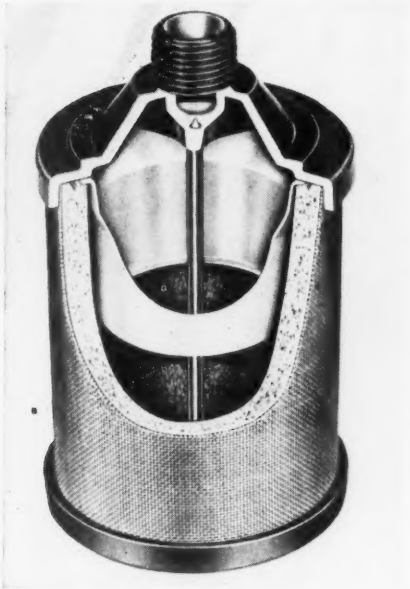
FLEXIBLE STEEL LACING CO.

4667 Lexington St., Chicago 44, Ill.

per minute. The light operates on 110-v power and is available in green, blue, amber and clear lenses. A red lens can be provided also which is restricted to warning usage in locations not in conflict with official municipal or governmental warning or emergency lights.

For More Details Circle No. 17—Page 247

Exhaust Muffler: Allied Witan Co., 4315 West 138th St., Cleveland 11, O.—Air exhaust muffler is said to eliminate noise caused by high-velocity discharge from air actuated devices. It employs an aluminum deflector shield designed to form an acoustic chamber to minimize direct contact of the disseminator by the high-velocity air stream, without sacrificing radiation surface. This shield acts as a condenser to precipitate



moisture present in the air system holding vapor spray to a minimum. These units are affixed directly to the exhaust aperture and will operate satisfactorily in any position, requiring no additional piping.

For More Details Circle No. 18—Page 247

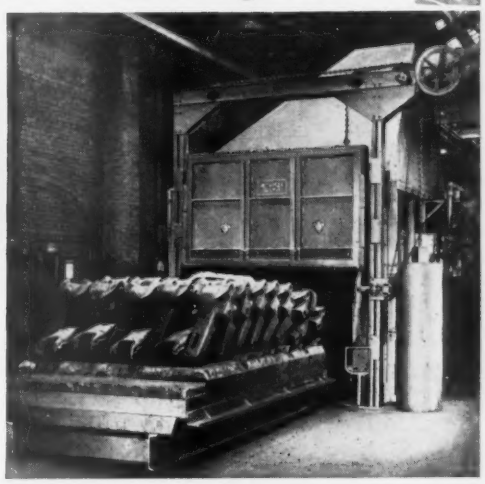
Pocket Pyrometer: Cybertronic Corp. of America, Dept. F, Industrial Center, Third & Morton Aves., Chester, Pa. — Pocket pyrometer measures 1¾ x 3½ x 3⅞-in. and has a 2.4-in. direct reading indicator scale. It reportedly offers quick, accurate measurement of surface and subsurface temperatures through use of interchangeable thermocouples. It is housed in a shock absorbing rubber case. Available in six standard ranges starting at 400°F.

For More Details Circle No. 19—Page 247

Unit Heaters: American Blower Corp., Tireman Ave. at Roselawn, Detroit 32, Mich.—Company has redesigned line of unit heaters for steam and hot water operation. They are

For Normalizing, Annealing and Heat Treating . . .

JOHNSTON CAR BOTTOM FURNACES



Engineering experience is apparent in the smooth operation of the Johnston Car Bottom Furnace. Roller bearings in car and door hoist shafts, mechanical car seals, and power operated car pullers are just a few of many practical features. Johnston "Reverse Blast" low pressure burners for oil or gas assure clean, economical, efficient heat for annealing, normalizing, and stress relieving.

Write for Bulletin F-240

Johnston Equipment for the Foundry
● Melting Furnaces ● Heating Torches ● Ladle Heaters
● Heat Treating Furnaces ● Burners, Blowers, Controllers
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Why not let our engineers review your set-up. There's no obligation. And, based on past experience, we're sure we can offer a helpful suggestion.

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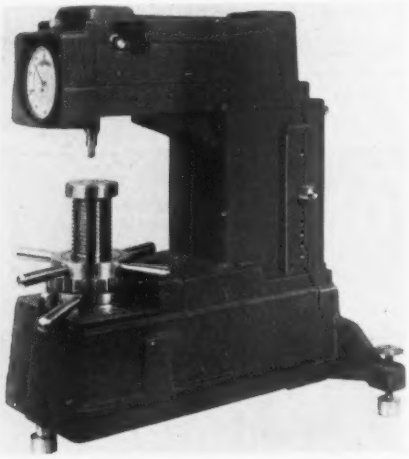
built in both horizontal and vertical types in wide range of sizes for industrial or commercial application. Heaters are said to be quiet operating and are tested and rated in accordance with standard test codes.

For More Details Circle No. 20—Page 247

Spout Magnets: Stearns Magnetic Inc., 635 South 28th St., Milwaukee 46, Wis.—Spout magnets held in place by magnetic force create a deep powerful magnet that removes tramp iron from flow of material. Magnetic components swing away from chute, allowing trapped iron to fall free automatically. Unit is available in various sizes.

For More Details Circle No. 21—Page 247

Hardness Tester: Torsion Balance Co., Clifton, N. J.—Instrument makes both regular and superficial Rockwell hardness tests with any



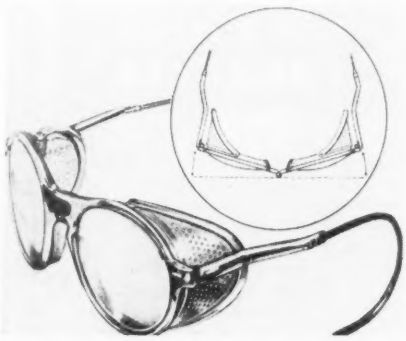
suitable "C", "N" or ball type indenter and all results show on a direct, easy-reading dial gage with a single numerical scale. Minor and major loads are applied by dead weights. Stops inserted on the sides of the column facilitate changes in test loads. Location of stop indicates the major load being used. Each tester is supplied with all weights for regular and superficial testing, $\frac{1}{16}$-in.-diam steel ball indenter, four anvils and eight test blocks.

For More Details Circle No. 22—Page 247

Leak Detector: Kinetic Engineering Co., M-217, Delaware Trust Bldg., Wilmington 1, Del.—Portable leak detector weighs 20 lb and requires only a supply of compressed air or inert gas for rapid, dry testing of instrument lines, castings, tanks bellows, and other items. Method used is to pressurize system under test through the leak detector, then isolate the system and display, through a high sensitivity pneumatic amplifier, any pressure change that takes place. Test pressure may be chosen anywhere between 10 and 30 psi. Leaks can be located and repaired without disconnecting the detector. Only one toggle valve needs to be manipulated for a complete test.

For More Details Circle No. 23—Page 247

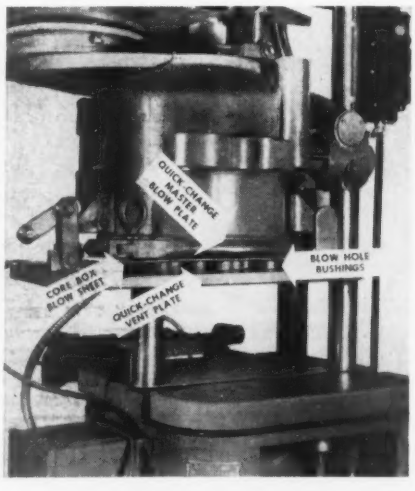
Safety Goggle: Willson Products Inc., 237 Washington St., Reading, Pa.—Through use of a hinged bridge one size of safety goggle is said to



fit all faces with complete comfort. A hinge of corrosion-resistant nickel silver permits the goggle to adjust automatically for any bridge width from 18 to 26 mm. Plastic strips for attaching side shields are molded as an integral part of the frame to add strength and provide a full protective closure around the eye cavity. Side shields are available with or without perforations.

For More Details Circle No. 24—Page 247

Core Blow Plate: Federal Foundry Supply Co., 4600 East 71st St., Cleveland 2 — Short run coreboxes can be rigged for core blowing by use of quick-change blow and vent plate assembly developed for use on company's core blowing machines. Plate eliminates need of machining expensive blow plates for open top core boxes, according to manufacturer. Blow sheets can be made in less than five minutes and changed on the machine in less than a minute. Blow sheet is inserted between the master blow plate and bushings of the vent plate, stopping



off the blow holes not required for the core box to be blown.

For More Details Circle No. 25—Page 247

Infrared Lamp: General Electric Co. Nela Park, Cleveland 12, O. — Infrared lamp, compact and tubular in shape, slightly larger in diameter than a cigarette and employing fused translucent quartz rather than heat-resistant glass, is designed for scores of drying, baking, and other industrial applications. Manufacturer claims the unit will produce more than four times the energy concentration delivered by a 250-w infrared bulb, and will withstand high temperatures and shock of violent temperature change. Two sizes are available, 500 and 1000-w, used on circuit voltages of 115-125 and 230-250, respectively.

For More Details Circle No. 26—Page 247

Carbide Tool Grinder: Hammond Machinery Builders Inc., 1600 Douglas Ave., Kalamazoo, Mich.—Wet or dry 6-in. carbide tool grind-

er has been added to the company's line of carbide grinders. Safety cup disk fills the open cup of the wheel and prevents hand injuries and dropping a tool into the cup of the wheel. A guard prevents escape of coolant which flows constantly from a self-contained pump and tank unit mounted in the base of the machine. To compensate for wheel wear, table adjusts by a screw feed. Two operators can grind tools at same time with freedom of movement and unobstructed vision.

For More Details Circle No. 27—Page 247

Portable Arc Welder: Kasson Die & Motor Corp., 32-14 Northern Blvd., Long Island City, N. Y.—Portable arc welder weighs 65 lb and operates on either 110 or 220 v ac 60 cycles with a rated output of 200

(*Continued on page* 254)

OREFRACTION

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For Foundry Practice —

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(*Continued from page* 252)

amp. It is claimed the welder will braze, cut, and preheat as well as weld steel, up to and including 1½-in. thick. Operation is said to be shock free, and by use of contact

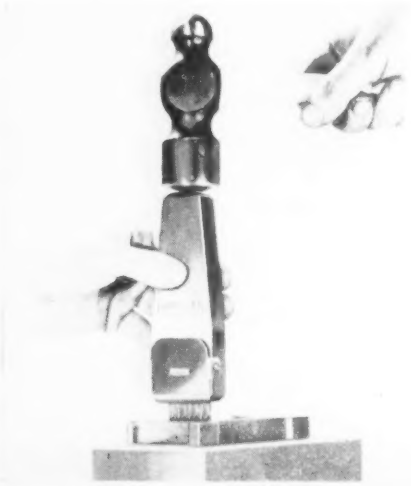
type electrodes anyone can make a professional weld merely by dragging the electrode along the work, as it is not necessary to maintain a definite arc with the contact electrode. It handles electrodes from $\frac{3}{64}$-in. up to and including $\frac{5}{32}$-in., using either metallic or carbon arc process.

For More Details Circle No. 28—Page 247

Belt Conveyor Carrier: Standard Products Division, Stephens-Adamson Mfg. Co., Aurora, Ill. — Belt conveyor carrier features 4-in.-diam rollers with spun ends that turn on precision ball bearings. Die-cast labryinth seals protect bearings and provide permanent protection as they are noncorrosive. Frames are welded steel. Formed steel brackets and inverted angle base are designed to prevent buildup of dust and dirt. Carrier rolls are interchangeable and can be inserted or removed from brackets without tools. Carrier is available in sizes for 18, 24, 30 and 36 in. belts.

For More Details Circle No. 29—Page 247

Type Holder: Acromark Co., 327 Morrell St., Elizabeth, N. J.—Lightweight holder holds interchangeable type for stamping on steel, cast iron or other materials. Sizes range from



a two-piece capacity holder to an eight-piece holder. Type can be changed by pressure on a front steel clip and removal of type. Hard metals as tool steel, cold-rolled steel and gray iron castings can be stamped satisfactorily, according to manufacturer. Sizes of type range from 1/16-in. Gothic up to and including ⅛-in. size. Sizes larger than ⅛-in. can be furnished in a larger size holder.

For More Details Circle No. 30—Page 247

Chemical Cloth: Hygiene Research Inc., 684 Broadway, New York 12, N. Y.—Chemically treated cloth for cleaning and mistproofing goggles, glasses, masks and windows is said to clean or mistproof surface from a few hours to two weeks, depending upon atmospheric conditions. Cloth can be used repeatedly and with care remains effective for six months or more.

For More Details Circle No. 31—Page 247

Visor Goggles: Mine Safety Appliances Co., 201 North Braddock Ave., Pittsburgh 8, Pa.—Visor goggles are designed to provide protec-

tion from flying particles, splashes and glare. Design features are an opaque green visor, either perforated for open-type ventilation, or screened for indirect ventilation, and interchangeable curved, one-piece lenses of clear, light green, medium, or dark green impact-resistant plastic. Shape of the lenses permits them to hug facial contours while not interfering with the wearing of glasses.

For More Details Circle No. 32—Page 247

Ear Insert: Sigma Engineering Co., 1491 North Vine St., Los Angeles 28, Calif.—Silicone-rubber ear inserts admit conversational tones but automatically close and protect the inner ear from pressure caused by sudden, loud noises or the concussion from explosions. The tiny de-

vice leaves the ear canal open to air circulation and permits intelligible sound to enter while removing the shock and harm from excessive noise.

For More Details Circle No. 33—Page 247

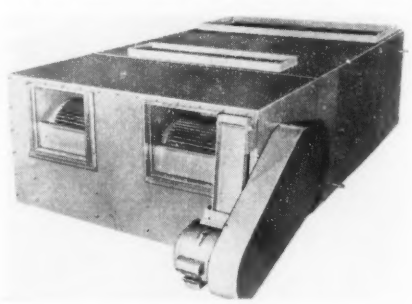
Power Cylinder: Hanna Engineering Works, 1741 Elston Ave., Chicago 22, Ill.—Fluid power cylinder of one-piece construction is treated for corrosion resistance and grooved for block vee synthetic packings to reduce friction and provide more positive sealing. Heads are high-strength alloy iron, permitting operation at higher pressures with increased safety margins. Cushion design assures positive cushioning over full cushion stroke and allows immediate full flow on return stroke.

For More Details Circle No. 34—Page 247

Electrode: Pacific Welding Alloys Co., 312 North Ave., Los Angeles 31, Calif. — Flux-coated electrode designed for electric arc cutting, chamfering, gouging and piercing reportedly has a fast cutting rate and is effective for work on all types of steels including cast iron and stainless, as well as copper and nickel alloys. The rod can be used with alternating or direct, reverse or straight polarity current, and is available in ⅛, $\frac{5}{32}$, $\frac{3}{16}$ and ¼-in. sizes, packaged in 10-lb metal containers for protection.

For More Details Circle No. 35—Page 247

Ventilation Units: American Air Filter Co., Louisville 8, Ky.—Combination heating-ventilating units, with capacities ranging from 1200 to



15,000 cfm, are claimed to provide heating, ventilation, filtering, humidifying, or any combination of these functions in various industrial applications. Models are available for installation on floors, ceilings or walls, with a wide range of cabinet

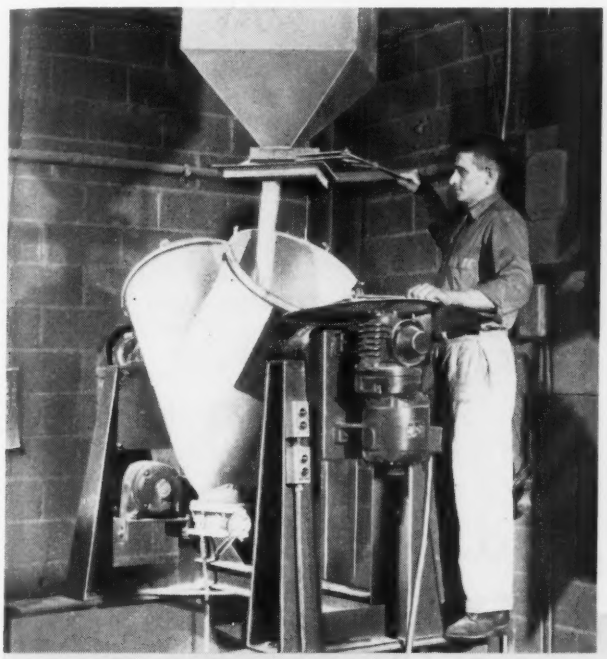
(*Continued on page* 256)

p·k Twin Shell Blender*

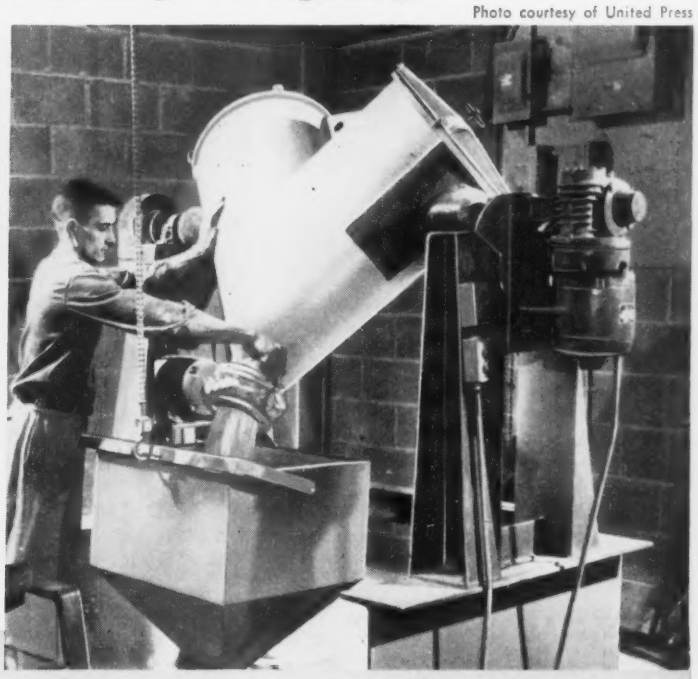
Cuts Blending Time in Half

for the Midwest Foundry Company

Photo courtesy of United Press



Feeding fine-grain silica sand and phenol-formaldehyde resin through one of the large access openings in the p·k twin shell blender.



Thoroughly blended shell-mold material is discharged into hopper before going to the shell molding machine. An electric hoist allows use of the same hopper for feeding material to the blender.

* Patented

Albert H. Doerr, chief engineer, Midwest Foundry Company, Coldwater, Michigan.

At Midwest Foundry Company (Coldwater, Mich.) the mixing of shell molding compound in a 5-cubic foot p·k twin shell blender actually *halves* the mixing time required by conventional mullers. This is the conclusion of Mr. Albert H. Doerr the Company's chief engineer.

The shell molding machine operator handles the p·k blender without interrupting his other duties and dustless precision blending takes only six to eight minutes for a 425 pound load. In this brief time, Mr. Doerr reports, the blender, equipped with the exclusive p·k intensifier bar* produces ". . . an even blend without resin segregation."

The easily removable intensifier bar rotates at high speed (2200 fpm) on the axis of the blender, creating a zone of intense activity into which blender action constantly feeds fresh material. The absence of baffles or obstructions of any kind permits complete, rapid discharge, and easy cleaning.

Because of the fast, efficient mixing afforded by this combination of tumbling and intensifier action, the p·k twin shell blender is widely recommended for use in the shell molding process. The right blender for your foundry is included in the full range of standard sizes—capacities from 4 quarts to 250 cubic feet.

Write today for Shell Molding Process Bulletin 404.

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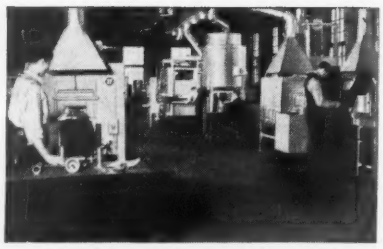
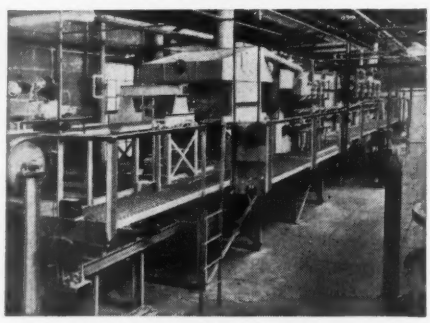


General view of the research department showing several of the continuous and batch type experimental furnaces.

● From our fully equipped research department we can determine accurately—from test runs—the combination of temperature, time cycle, atmosphere and other factors needed to produce the exactly desired result,—assuring—in advance—the efficient performance of EF furnaces **fully up to specification.**

Many large companies have drawn liberally upon this department in developing new products, and new techniques. Our facilities are available to YOU also—for YOUR research or development work, either gratis or for a moderate fee, depending upon the nature of the experiment. We will be glad to schedule time for your technicians, or write today for our 12 page booklet, "Research Facilities". It describes the equipment we can place at your disposal.



View of combination gas-fired and electric continuous furnace equipped with flame preheating burn-off or oxidizing section and controlled heating, soaking and cooling zones, for producing various surface conditions on strip.

Gas-Fired, Oil-Fired **EF** ***and Electric Furnaces***
for any Process, Product or Production
THE ELECTRIC FURNACE CO.
WILSON ST. at PENNA. R. R. *Salem - Ohio*
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*Ottawa Blackhawk Silica
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Utica Crude Silica
Silko Molding
*Zircon Sand, Flour and Wash
Berlin Coresand
Red Flint Annealing
New Jersey Molding
Gallia Red Molding
Albany Molding

BONDING CLAYS
*Volclay, MX-80 (Granular)
*and Panther Creek Bentonite
*Goose Lake Fire Clay
*Grundite Bonding Clay

ABRASIVES
Tru-Steel Steel Shot
*Certified Shot and Grit
*Malleabrasive Shot and Grit
*Blackhawk Sand Blast Sand
*Super-Titan Nozzles

REFRACTORIES & MISC.
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Firegan Ganister
*Microsil Silica Flour
Fluxing Limestone
*Five Star Wood Flour
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Fluorspar—Lump & Gravel
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MUSKEGON 4-7248

(*Continued from page* 254)

designs and air volumes offered. Units are available with any of ten different heating coils. Sectional design of the units, with the completely rotatable fan sections, permit the selection of components required.

For More Details Circle No. 36—Page 247

Dry-Film Coatings: Acheson Colloids Co., Port Huron, Mich. — Dry-film coatings, one containing colloidal graphite and other containing colloidal molybdenum disulfide, are claimed to show excellent adhesion and wear resistance, when properly applied. They are unaffected by oils and solvents, and can be used at temperatures below 500° F. All types of surfaces, whether or not pretreated by chemical or mechanical means, can be coated. Uses include dry lubricating film for high-temperature screw threads, precision gears, bearings, and shafts.

For More Details Circle No. 37—Page 247

Crane Control: Whiting Corp., Harvey, Ill. — Selective magnetic hoist control uses 11 speeds in each direction and the operator can select

instantly any one. The device is available for use on all capacities of the company's overhead cranes and can be installed on cranes now using conventional controls. Basic parts of the control are the dual master switch, a magnetic hoist controller and an eddy current brake. Use of the load brake prevents loads from settling at any of the control's 11 points, even if the load exceeds the crane's rated capacity. Friction parts are cooled and lubricated by the oil pump action of herringbone gears and the entire unit is enclosed in an oil-tight housing.

For More Details Circle No. 38—Page 247

Pyrometer: Pyrometer Instrument Co., Bergenfield, N. J.—Optical pyrometer is designed for precision temperature measurements in the laboratory yet is sufficiently portable to be used for general plant applications. It is capable of measuring targets less than 0.001-in. diam and,

QUICK—
ACCURATE
Temperature Readings
in Non-ferrous
Molten Metals with

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HAND PYROMETERS

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The XACTEMP PYROMETER makes possible better quality control and helps toward elimination of blowholes, burnouts, sand infiltration and other flaws due to incorrect temperature . . . affords a simple, effective means for accurate temperature measurement of molten, non-ferrous metals. Well-balanced, easy to handle . . . always ready for use and requires no preliminary adjustments.

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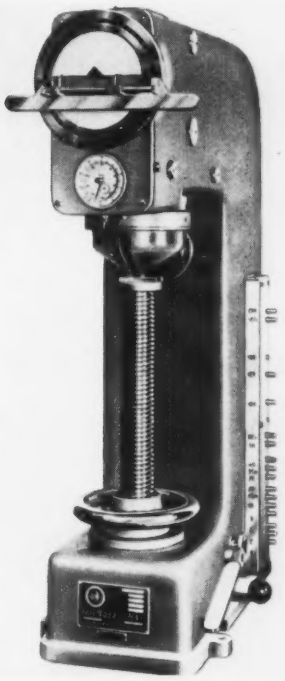
by means of supplementary lenses, can be adjusted for focal distances varying from 5 in. to infinity. Mountings in table-top and floor tripods are available and the vernier worm gears permit fine vertical and horizontal adjustments of the telescope. Optical system includes a microscope type ocular providing a 20 power magnification of the object under measurement and the wide scale direct-reading meter makes it possible to reproduce temperatures accurately. Carrying case for the entire assembly is available.

For More Details Circle No. 39—Page 247

Hardness Tester: Gries Industries Inc., Testing Machines Division, New Rochelle, N. Y.—Reflex machines for hardness testing feature



automatic projection of indentations. Load selection is said to be simple and rapid. All weight blocks remain permanently in machine. Operator presses push button for particular test load desired. After test load has been removed, the magnified image of the indentation produced is automatically projected on a ground glass screen. Magnification to 140 times is possible. Ground glass can be replaced by a photographic plateholder.

For More Details Circle No. 40—Page 247

Safety Hook: Coffing Hoist Co., Danville, Ill.—Drop forged, heat-treated alloy steel hook is claimed to offer maximum safety to men and equipment during lifting operations. Once the hook is engaged, a steel latch swings down and is held in place by a lock that is under spring tension. The latch cannot move sideways because it fits snugly over the

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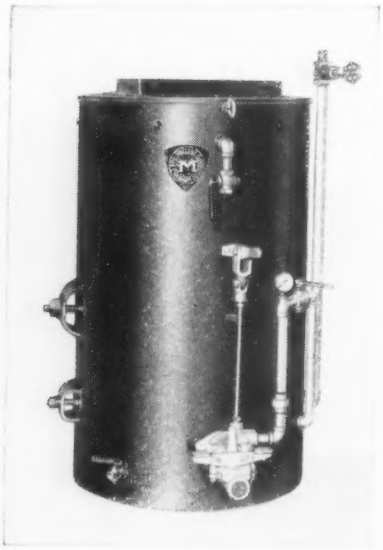

"Blast cleaning with the modern Macleod equipment has cut my costs in half. I should have discarded my old-fashioned cleaning methods years ago"—a typical comment from a satisfied Macleod user.

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The Macleod Type "H" machine is available in two standard sizes (8.5 cu. ft., and 10 cu. ft.) or in special capacities on request. It can be furnished either as a portable or stationary machine. Macleod also offers a complete line of other blast cleaning machines, cabinets, and rooms to meet every need.

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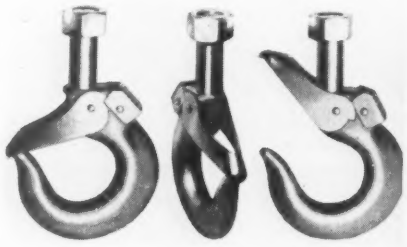
point of the hook. Slight pressure on the release unlocks the latch, and spring tension on the release holds the latch open. The latch is designed



to allow full and unobstructed use of the hook's throat opening and is said to shed wires and other objects rather than snag them.

For More Details Circle No. 41—Page 247

All-Purpose Hose: Republic Rubber Division, Lee Rubber & Tire Corp. Youngstown, O.—Oil-resisting Reprene compound hose is reinforced with braided rayon cords to make a hose for industrial use that is said to conduct air, oxygen, acetylene, water, oil, grease, gasoline, kerosene and many dilute chemical and acid solutions. It is recommended for use on air operated tools in foundries, factories, shipyards for welding, cutting, spraying and all types of water service. It is not recommended for conducting lacquer, lacquer solvents or steam. It is available in sizes from $\frac{3}{16}$-in. ID through $1\frac{1}{2}$-in. ID.

For More Details Circle No. 42—Page 247

Fire Fighter: Kalamazoo Mfg. Co., Kalamazoo, Mich.—Compact, three-wheel, one or two-man in-plant fire fighting truck is designed

to supplement permanent fire prevention systems. Truck can be equipped to carry complete high-pressure fog systems, 210 gal of water, 100 ft of booster hose, rotary pump, foam concentrate, and any extinguishers desired such as CO_2 and dry chemicals as well as fire axes, crowbars, first aid kits, and ladders.

For More Details Circle No. 43—Page 247

Gas Alarm: Johnson-Williams Ltd., 2702 Park Blvd., Palo Alto, Calif.—Compact, self-contained combustible gas alarm offers explosion protection for single-point hazardous

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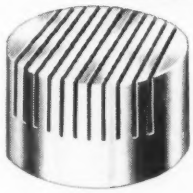
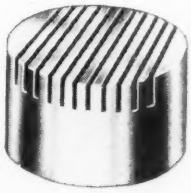
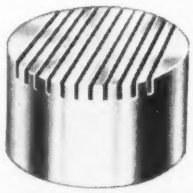


X-TRA DEEP HEAD .156 Wide Slots .014

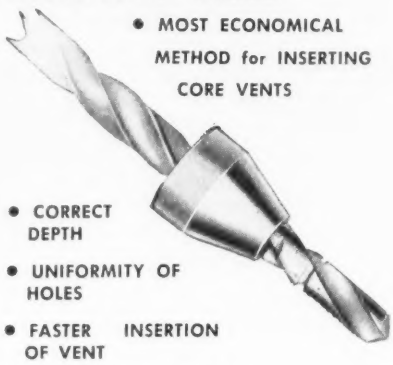


DEEP HEAD .093 Wide or Narrow Slots .014 .010



SHALLOW HEAD .031 Wide or Narrow Slots .014 .010

INSERTING DRILL



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operations such as drying ovens, process areas, hydrogen-brazing areas, fuel piping, tunnels and systems, and laboratories. Dust-proof, the unit is designed for surface or flush mounting. Vapor samples are drawn through tubing continuously from the point of the potential hazard, and the explosibility is shown on an indicating meter in the open face of the housing. When combustibles reach a preset level, an internal relay closes the circuit, actuating whatever type of signal lights or horns the user may wish to connect. Powered from a constant-voltage transformer operating on 115 v 60 cycle single-phase power, the unit requires 50 w.

For More Details Circle No. 44—Page 247

Face Shields: E. D. Bullard Co., 275 Eighth St., San Francisco 3, Calif.—Acetate clip-on and swing-back type face shields offer eye, face

and throat protection for wearers of both plastic and metal safety hats and caps. Tight-fitting, spring steel clips secure shield to brim of hat or cap. No holes to drill. No attachments are needed. For the worker who needs infrequent face protection, a swing-back model is available for attachment to a safety hard hat by drilling and bolting. A light-weight aluminum bracket swings to any desired angle or to an overhead position. Varying lengths in both styles are available.

For More Details Circle No. 45—Page 247

Repair Compound: Smooth-On Mfg. Co., 572 Communipaw Ave., Jersey City, N. J.—Aluminum compound can be used for repairing castings, filling joints in sheet metal and building up surfaces of patterns, molds, and dies. The material, an epoxy resin compound, hardens by polymerization following the addition of a curing agent, and not through evaporation of a solvent. It can be applied in any thickness without cracking and with negligible shrinkage; is hard, tough, machinable down to a feather edge, and has good chemical stability, according to the manufacturer. At room temperature

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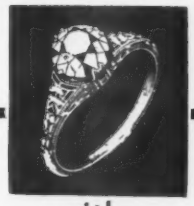

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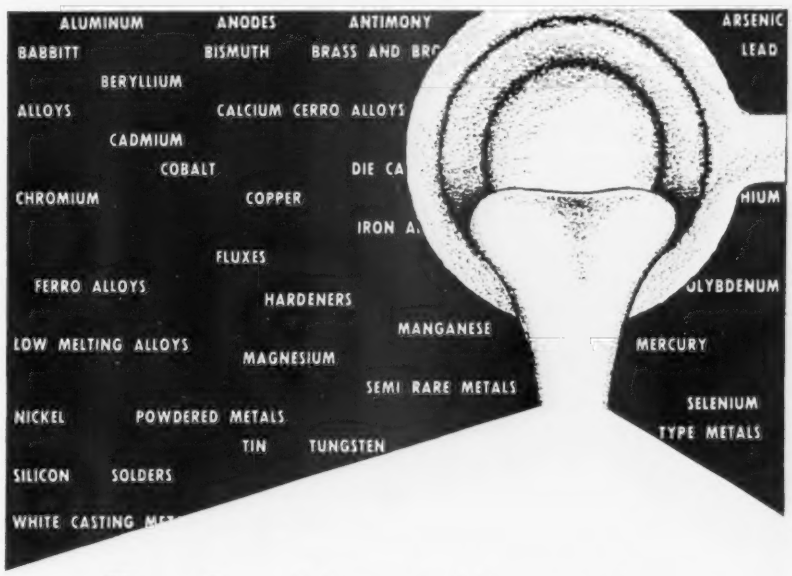

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it cures in a few hours. The rate of cure varies with thickness of the application. Large sections harden more rapidly than small ones. Application is by a spatula or other small hand tool. The compound can be stored indefinitely and is noncombustible.

For More Details Circle No. 46—Page 247

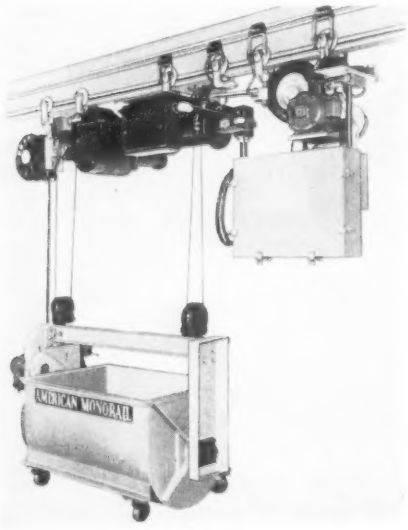
Shell Mold Resins: Reichhold Chemicals Inc., 525 North Broadway, White Plains, N. Y.—Two liquid phenolic, water-soluble resins for making shell molds and cores can be employed with standard foundry equipment and offer advantages of lower costs and improved performance, according to the manufacturer. The core resin is said to eliminate the need for cereals and water as binder components. The shell mold resin has a high solids content and is combined with sand in the proportion of 100 parts of sand to two parts of resin.

For More Details Circle No. 47—Page 247

Steel Liners: Beardsley & Piper, Division Pettibone Mulliken Corp., 2424 North Cicero Ave., Chicago 39, Ill.—Hard, resilient, wear-resisting alloy steel liners for use in sandslingers reportedly increase slinger efficiency, reduce costs, cut downtime, and extend liner life considerably, especially under the abrasion of highly abrasive material. Liners have been tested extensively in foundries before being introduced commercially.

For More Details Circle No. 48—Page 247

Roll-Over Carrier: American MonoRail Co., 13107 Athens Ave., Cleveland, O.—Automatic carrier is designed for intermittent transfer of



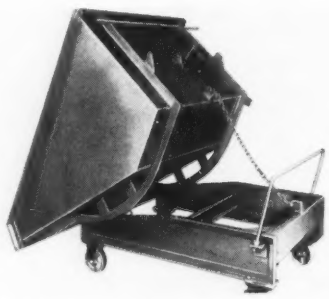
bulk materials between a single loading point and any number of discharge stations. Twin-hook electric hoist raises and lowers special bucket equipped with casters for manual positioning on floor. Bucket is mounted on rigid frame with one end geared to an electric motor which turns bucket one complete revolution at the discharge point. Unit also carries electric controls for automatic dispatch, station selection, and manual operation.

For More Details Circle No. 49—Page 247

Bronze Electrode: Alloy Rods Co., 5130 Lincoln Highway West, York, Pa.—Electrode for welding manganese bronze without the need of high preheating temperatures eliminates a major cause of distortion and warpage. Welds produced reportedly are of high strength, ductility, and soundness. Some applications include repair and reclamation of manganese bronze ship propellers, gears, pump housings, impellers, mixer beaters, worms, and valves. Welding fabrications from plate also are said to be practical.

For More Details Circle No. 50—Page 247

End Dump Trucks: Klaas Machine & Mfg. Co., 4314 East 49th St., Cleveland 25, O.—Wheeled or



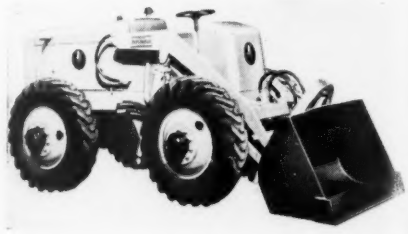
pallet-type end dump trucks feature simple lock dumping release. Flange on either side along top edge is optional for transporting via overhead handling equipment. Trucks are built to specification from thick-gage metal.

For More Details Circle No. 51—Page 247

Storage Battery: Edison Storage Battery Division, Thomas A. Edison Inc., West Orange, N. J.—Storage battery for electrical industrial trucks has been developed for use where space available for the battery is limited, as in trucks of the driver-ride sit-down type. Cells of the battery employ the standard steel tube and pocket construction of the plates which manufacturer claims provides durability and long life. Capacities range from 285 amp-hr to 710 amp-hr. Standard assemblies range from 10 cell, rated capacity 3.42 kw hr to 42 cell, rated capacity 35.78 kw hr. Batteries can be charged at full normal rate.

For More Details Circle No. 52—Page 247

Front Loader: Frank G. Hough Co., 703 Seventh St., Libertyville, Ill.—Company has added to its line of torque converter driven tractor shovels a four-wheel drive unit with a bucket capacity of 1 cu yd struck-load and 1 1/3 yd payload (heaped). Model is available with either gas or diesel engine and is equipped with power steering. Heavy-duty, full re-



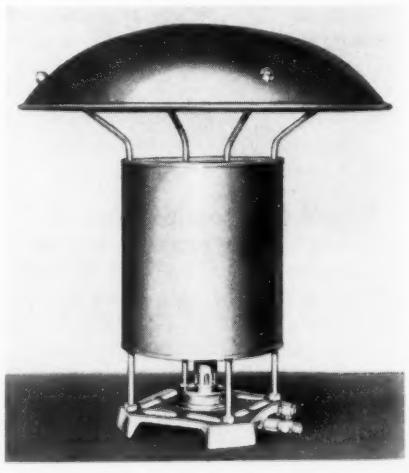
versing transmission provides four speed ranges in either direction. Hydraulically controlled bucket automatically positions itself for digging.

For More Details Circle No. 53—Page 247

Conveyor Lubricator: J. N. Fauver Co., 51 West Hancock, Detroit 1, Mich.—Automatic conveyor lubricator injects either grease or oil. Models are available that will lubricate one side only, both sides of a monorail conveyor or apply a controlled volume of lubricant to the wheel bearings of trolleys. The unit can handle a wide range of lubricants from light oil to heavy fiber greases. The lubricator is a self-contained unit mounted on the trolley rail and actuated by the moving conveyor. Each pumping unit is adjustable to the quantity of lubricant discharged into each wheel bearing. Grease or oil is supplied from the reservoir at constant pressure that is varied in accordance with viscosity of lubricant.

For More Details Circle No. 54—Page 247

Portable Salamander: Weldit Inc., 990 Oakman Blvd., Detroit 6, Mich.—Portable, liquefied petroleum salamander reportedly generates 151,-



200 Btu's and consumes 7 lb of gas per hour, requires no priming or pumping, has positive control, and no smoke or soot. Heat distributor plate gives 360° heat distribution.

(*Concluded on page* 262)

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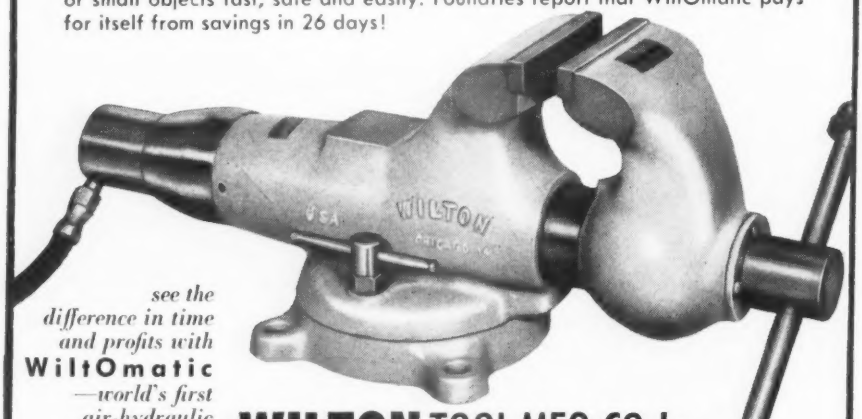

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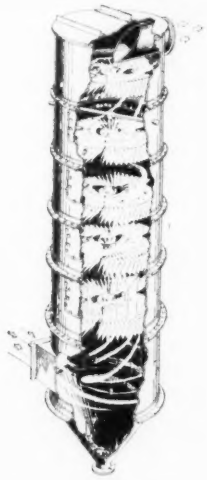
(*Concluded from page* 260)

Construction is of steel and cast iron. Two models, a floor type and a tank type, are available.

For More Details Circle No. 55—Page 247

Wet Dust Collector: Pangborn Corp., 1400 Pangborn Blvd., Hagerstown, Md.—Centrifugal wet dust collector of counter-current design and



tower type construction features principle of the flow of ascending air or gas counter to the descending fluid with performance claimed to be improved through more intimate interaction between the elements. The collector consists of multiple wet impingement vane sections topped by a water entrainment vane section. Capacity of the collector is proportional to the diameter, and the number of wet vane sections specified is governed by application requirements. Collector design has sufficient flexibility to permit a considerable increase in air or gas and liquid without impairing collector action.

For More Details Circle No. 56—Page 247

Safety Attachment: Kwik-Mix Co., 3029 West Concordia Ave., Milwaukee 16, Wis.—Simple safety attachment to fit company's motorized wheelbarrow is welded to the riding step to provide a guard and support for the operator. Attachment consists of a heavy gage steel upright post ending in a broad curved steel plate. It is said to protect the operator from shock and also serves as a back support to help reduce fatigue.

For More Details Circle No. 57—Page 247

Power Unit: Ready-Power Co., 3826 Grand River Ave., Detroit 8, Mich.—Interchangeable gas-electric power unit is designed for installation on 2000 to 5000 lb sit-down-type electric trucks without need for seat alteration. Instrument panel is located within easy reach and view of operator. Fuel tank and starting battery are outside the housing.

For More Details Circle No. 58—Page 247

Notch Ductility

(*Continued from page* 119)

transition temperature, and many cases have been observed where a material with a Charpy value which continues to rise with temperature to an upper shelf at 100 ft-lb is more susceptible to brittle failure at a given temperature than one with its upper shelf at the 20-ft-lb level. The important factor is the temperature range over which the Charpy V transition occurs, as discussed in detail in a prior publication.[3]

Effect of Composition and Microstructure—Fig. 8 shows the effects of alloying elements and microstructure on the drop weight nil-ductility transition temperature of heat treated nodular irons. The most important factors affecting the drop weight transition temperature are silicon, phosphorus, pearlite and free carbide. Furthermore, the effects are essentially linear and additive—that is, a given increment of silicon will raise the drop weight temperature by an equal amount regardless of the pearlite level. The effects of elements other than silicon and phosphorus are negligible. Using the slopes of these curves, investigators developed the following formula for predicting ductility transition:

$$\text{Transition temp. } °F = -203 + 88\,(\%\text{Si}) + 725\,(\%\text{P} - 0.03) + 1.8\,(\%\text{ Pearlite} - 5) + 30\,(\%\text{ Carbide} - 3)$$

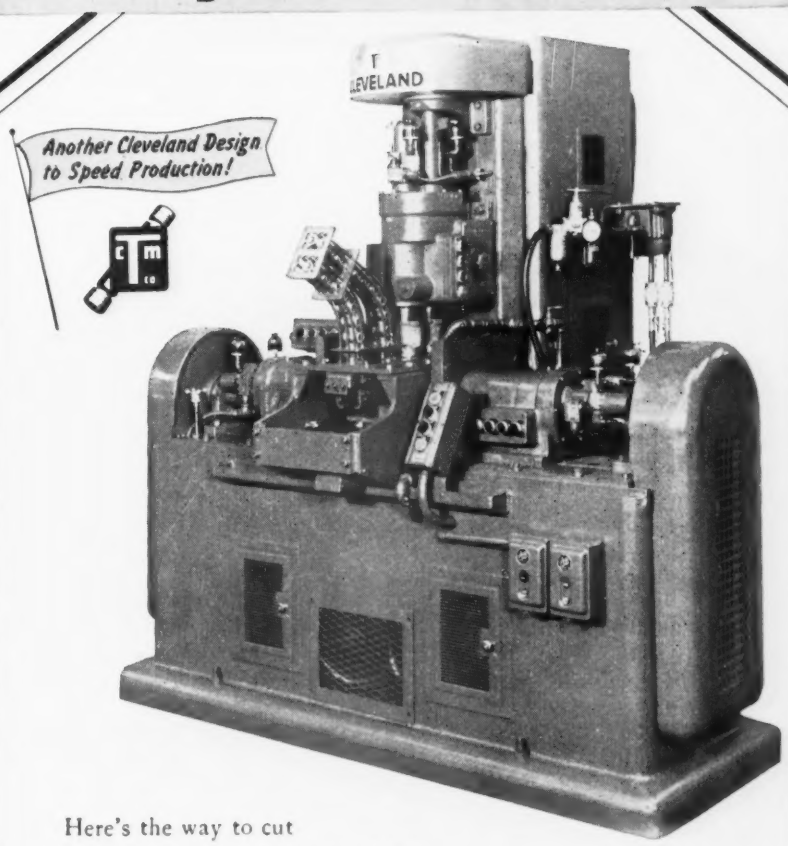
In cases where the phosphorus is below 0.03 per cent, pearlite below 5 per cent and carbide below 3 per cent, the pertinent factors in the equation are considered to be zero. The calculations for the ductility transition of an iron containing 3.18 per cent C, 2.70 per cent Si, 0.30 per cent Mn, 0.15 per cent P, 9 per cent pearlite and 2 per cent carbide would be as follows:

$$T = -203 + 88\,(2.7) + 725\,(0.15 - 0.03) + 1.8\,(9-5) + 0 = 129°F$$

The calculated transition temperature is adjusted to the nearest multiple of 10° (130°F in this case) to correspond to the actual drop weight values, which are determined to the nearest 10°F. If a transition temperature lower than 130°F were required, it could be obtained by adjusting the Si and P levels. Thus, according to the formula, a reduction in the phosphorus content from 0.15 to 0.10 per cent would lower the ductility transition to 95°F, and a simultaneous reduction in silicon content from 2.7 to 2.2 per cent would lower the transition to 50°F.

Pearlite contents of most of the

1308 tee fittings per hour!



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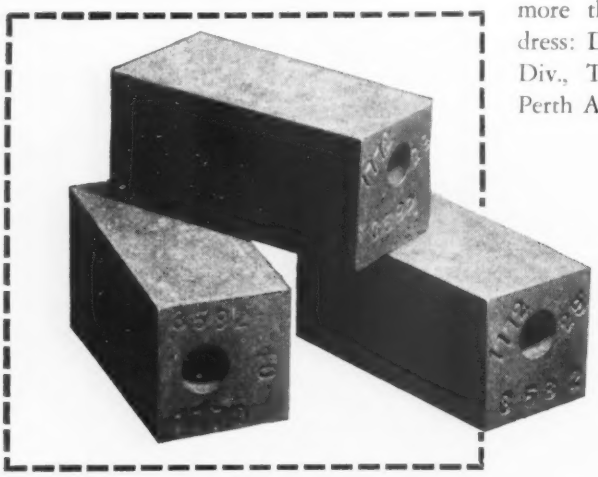

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irons described in these studies were determined accurately by linear analysis methods. It was found however, that reasonably close approximations of the transition temperature could be obtained from visual observations of the microstructures and from comparisons with micrographic standards in which the amounts of pearlite have been determined accurately.

Table I lists the transitions as determined by the drop weight test and as calculated from the formula for a large variety of nodular irons. Fig. 9 provides a correlation of actual and calculated values. Agreement usually is between ±20°F. The various irons listed in Table I have been subdivided into four classes according to their resistance to brittle failure as determined by the drop weight test. In Class 1 are those having ductility transitions of 0°F and lower. These may be considered premium grade irons suitable for severe service in cold weather. The fracture resistance of this class is superior to semikilled and rimmed, rolled steels of 1-in. thickness[1, 2] (drop weight test range for such steels is 0 to 60°F).

Characteristics Are Variable

These are characterized by very low Si and P contents and by matrices which are 95 to 100 per cent ferritic. In class 2 are irons having transitions between 0 and 50°F, which are essentially equivalent in fracture resistance to commercial rolled and cast steels. These irons contain moderate amounts of either P, Si or pearlite. The third class has ductility transitions between 50 and 100°F, and irons in this class are potentially susceptible to brittle fracture at warm temperature. In the 4th class are the high strength pearlitic irons and irons containing relatively large amounts of Si and P. These irons have ductility transitions above 100°F and may be expected to be brittle at temperatures below 100°F even in the presence of relatively mild notches.

Whether or not nodular iron castings meet the requirements of a given class could be determined easily if two drop weight specimens were cast and heat treated along with the heat and were tested at the lowest temperature for the class. In cases where the lowest service temperature of the castings is known, control specimens would be tested at this temperature. Failure of specimens to fracture, would indicate that in service the castings would not fail in a brittle fashion.

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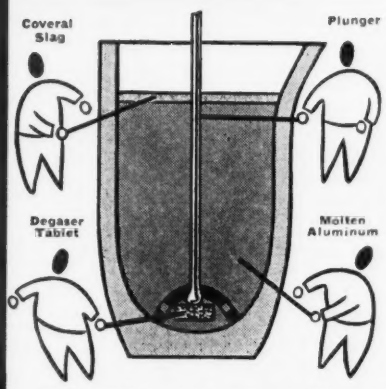

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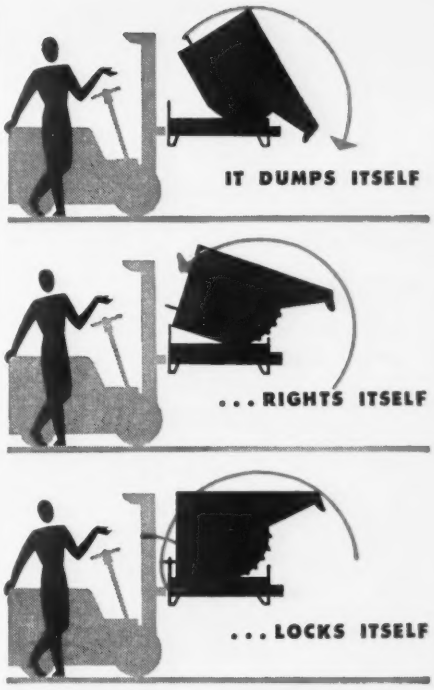
relation between results obtained with 1-in. thick test specimens and castings having different section thicknesses. It has been found[3] that the ductility transition obtained with specimens removed from 2 and 4-in. thick plates is the same as the transition obtained with specimens cast to size if there are no differences in the matrix structures. It has been observed in the irons tested that microstructural differences in the matrix resulting from section size exist only in the as-cast condition and are eliminated after austenitization; thus in heat treated irons the 1 in. test specimens are representative of a variety of section sizes.

In a number of the heats listed in Table I, extra drop weight specimens were available after the transition temperature had been established. In order to demonstrate how the drop weight test can be employed to evaluate materials without actually establishing a transition temperature, it was assumed arbitrarily that irons were needed which could be resistant to fracture initiation at 80°F. Accordingly, these extra specimens were tested at this temperature in one batch. Those which failed are indicated by X marks, those which did not are indicated by O marks. None of the class 1 and 2 specimens failed, whereas all class 4 specimens did. This behavior was expected since the transition temperatures of these irons were at least 20°F below or above the temperature of the test.

Expected Performance Verified

In the class 3 series of Table I, all irons with transitions of 60°F and 70°F should be expected to pass when tested to the 80°F specification, and all irons with transitions of 80°F, 90°F and 100°F should be expected to fail. All except two irons performed as expected. One of three specimens, heat 41, with a measured drop weight transition of 70°F, failed when tested at 80°F. The other iron, heat 36, with a measured transition of 80°F, produced two passing samples when retested at 80°F. Such slight inconsistencies mean simply that the specification temperature falls within the ±10°F scatter range of the material. In no case was disagreement manifested with irons in which previously measured drop weight transitions occurred at more than ±10°F from the 80°F specification. If the results of tests at the 80° specification are compared with the fracture behavior predicted by the formula, only two additional borderline cases show de-



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Two foundry specialists pour the metal from crucible to the mold

View of General Electric's small-scale duplicate of modern shell mold foundry, set up to provide consulting service on shell mold problems

GE Establishes . . .

EXPERIMENTAL SHELL MOLD FOUNDRY

AN experimental shell molding foundry, with facilities for making shell molds, pouring castings and testing phenolic resins, has been established by the General Electric Co. at its Chemical Materials Department laboratories, Pittsfield, Mass. The experimental operation permits GE to study factors affecting shell and casting quality, not only in the intermediate area of shell mold making but also in the final pouring of the casting designs under consideration.

This small-scale duplicate of shell molding production operations includes sand mixing and shell making equipment, induction melting and pouring facilities for all common foundry alloys so as to precisely reproduce castings using the customer's production cycle and alloys.

The foundry will permit constant testing and improving of phenolic resins for the shell molding process, as well as provide trouble shooting service for foundries.

Engineers in the experimental foundry will offer such consulting services as recommendations on casting design, pattern construction, melting and pouring procedures, shop equipment and layout, resin-sand mixtures, types of resins to be used for sound shell properties, and techniques for assembling and fastening shell halves together.

---

viations. There is no indication that materials outside of borderline cases according to the formula will fail the test; thus, foundries controlling analyses according to the formula could produce castings of any specified class with a high degree of certainty using conventional chemistry and microstructure control.

Hardness provides a very rough and unreliable guide for determining ductility transition temperatures; this point is illustrated in Fig. 10, where hardnesses are compared to drop weight temperatures for all the irons investigated. The scatter observed is due to such factors as carbide effects not fully reflected in hardness readings and to solid solution hardening effects of elements such as Mn, Ni or Cu which do not significantly affect transition temperatures.

Summary — The importance of notch ductility in applications of nodular iron (or steels) depends on the type of service expected; for severe service at low temperatures, a high order of notch ductility is essential. Increasing amounts of Si, P and pearlite and the presence of free carbides raise the temperature of sensitivity to the presence of notches; the individual effects are additive. The notch ductility of nodular irons may be controlled so as to be equal to, better than or inferior to that of commercial structural mild steels.

The drop weight test provides a simple means of measuring and insuring adequate notch ductility for the most severe notch conditions to be expected. The test is highly reproducible and easily can be adapted to foundry use at low cost. The producer as well as the user of nodular iron castings should find the drop weight test advantageous, for it allows compensation for plus and minus factors affecting notch ductility and resolves the difficult problem of evaluating microstructure.

The confidence of materials engineers and designers in the notch ductility of specific materials is rapidly becoming a determining factor in decisions relating to many applications and therefore is a matter of vital significance to producers. It is important to recognize that nodular irons are a "family" of materials possessing not only different hardness, strength and tensile ductility, but also widely different notch ductility.

Acknowledgement—This investigation was conducted at the request of and with the support of G. Sorkin, Bureau of Ships, U. S. Navy Dept.

References

1. Pellini, W. S., "Evaluation of Significance of Charpy Tests," ASTM Symposium on Metallic Materials at Low Temperatures, 1953.
2. Puzak, P. P., Schuster, M. E. and Pellini, W. S., "Applicability of Charpy Test Data" (to be published in *Welding Journal*).
3. Pellini, W. S., Sandoz, G., and Bishop, H. F., "Notch Ductility of Nodular Iron," *Transactions*, ASM, 1954.

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Productive Maintenance

(*Continued from page* 123)

routine maintenance effort is to be expended should be transferred to a permanent, easy-to-control record system. The usual practice is to assign a number to each machine or other piece of equipment. This number lives with the component throughout its life in the plant and is used in the maintenance records as shown on the typical equipment card. Other material on the card should include the machine's location and department, application information, purchase and installation cost, rating and renewal parts information.

The objective of Step 2, evaluating for routine maintenance, is to determine the most desirable amount of maintenance for the equipment listed. Too much maintenance is too expensive, and too little results in loss of production time. What is needed can be called an optimum amount of routine maintenance, which will result in the lowest possible product cost. There are two basic requisites for arriving at this optimum amount of routine maintenance.

The first is to prevent too great an amount of equipment downtime and resultant lost production. The second requisite is to take a long-term view of the situation in order to decide whether it is more economical to practice routine maintenance on a certain piece of equipment or to run the equipment to breakdown, with resultant high cost of repairs and shorter equipment life. Ordinarily the decision is for routine maintenance, which frequently extends periods between major overhauls and repairs, in addition to extending life of the equipment. If several operations are dependent on a single machine, routine maintenance obviously is required. If the load of a machine can be picked up elsewhere, however, with no lost production time, the need for routine maintenance may be questionable.

Step 3 is the establishment of a routine operating control system—the scheduling of inspection and work. A file should be set up which includes three cards for each item of equipment. These include the equipment record card just described, a maintenance inspector's card and a maintenance repair and replacement record card. All three are kept in a file pocket at the bottom of which a colored signal is used to call for the actual inspection dates.

Usually inspection instructions are included on the card, which accompanies the inspector when he examines the equipment. Upon completion of his inspection, the inspector fills in the date of inspection and the condition of the machine. If work is required, he fills out a separate work order. In any event, the card is returned to the file and set to signal the date of the next required inspection. It should be stressed that work orders should be expedited so that important work is not held up.

As mentioned, the file should include a maintenance repair and replacement record card for keeping costs, kept with the equipment record card and the inspector's card. Costs are obtained from the costed copy of the work order and transferred to the record card. A record of these costs can show misapplications, poor equipment quality and overage equipment.

An important part of Step 3 concerns control of inventories. There are two fundamental requirements: 1. Money invested in the inventory must work to the best advantage. 2. Parts and materials required for routine maintenance must be immediately available.

To set the optimum turnover point, stock can be divided into three classifications, "A," "B" and "C." At GE, the A classification is comprised of the 10 per cent of items which account for about 70 per cent of the total yearly inventory investment. In the B classification go the 50 per cent of the items in stock which account for about 20 per cent of the yearly inventory investment. Finally, the 40 per cent of items which account for about 10 per cent of the total yearly investment go into the C classification. Percentages of

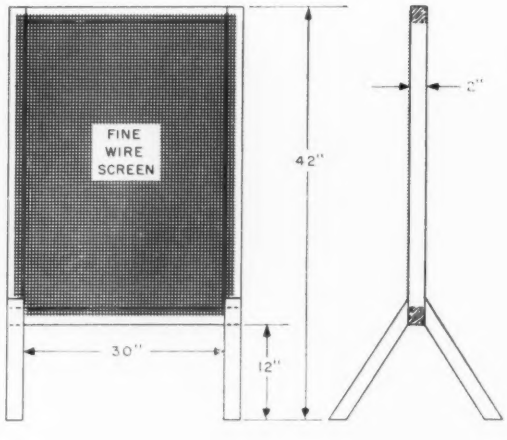
(*Continued on page* 270)

HOW TO DO IT

Screen Protects Pourer from Heat of Metal in Open Mold

DURING the casting of gray iron floor plates in large, open, green sand molds, a foundry had the problem of protecting the pourer from intense heat and glare emanating from the 48 x 72 x 2-in. open mold cavity when filled with molten metal. Molds were poured from a 3000-lb capacity geared bull ladle suspended from an overhead crane. Ladles were about three-quarters full so that lip of the ladle could be placed close to the pouring cup before the metal began to flow.

Protection was achieved by placing a screen between the pourer and the mold. Constructed of wood framing and ordinary house wire screening, the screen measured 30 in. wide and 42 in. high and was equipped with legs to hold it upright. Being portable the screen could be moved to each of the molds as they were poured. The pourer could see the mold and ladle through the screen and thus control pouring rate.



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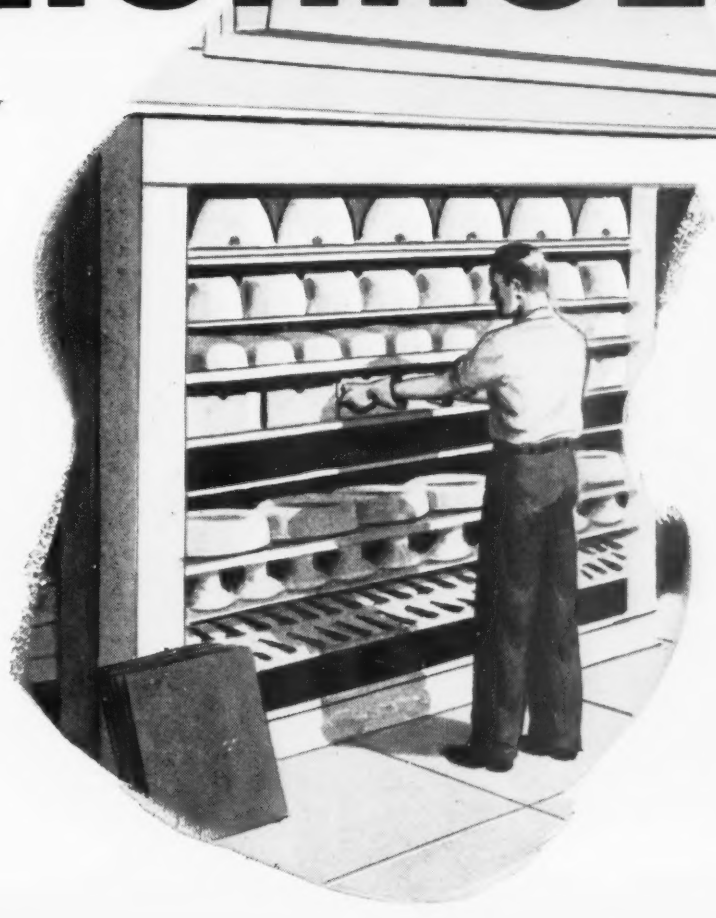
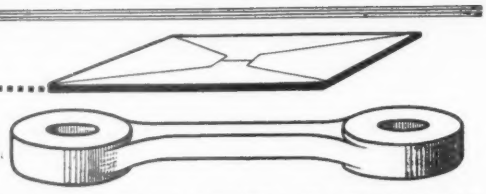


Synthetic Resins
Chemical Colors
Phenol
Glycerine
Phthalic Anhydride
Maleic Anhydride
Sodium Sulfate
Sodium Sulfite

Gamma rays.....
unexposed film.....
steel casting.....



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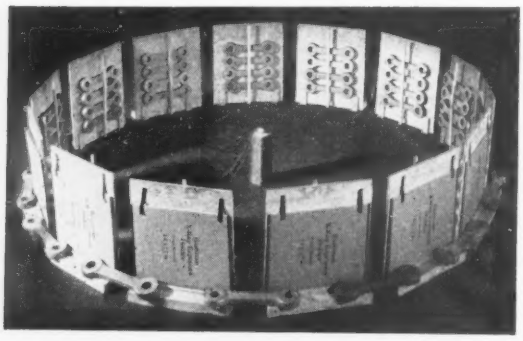

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(*Continued from page* 268)

items in each class may vary in a given industry, but any firm can class its inventory items similarly.

With the A items, investment should be kept as low as possible and turnover as high as possible. A lesser degree of control is required with the B items, and larger buffer stocks are permissible. The same is true to an even greater extent of the C items.

To accomplish the second requirement of good inventory control, it is necessary that a streamlined record procedure be set up. The objectives are to obtain optimum turnover rate on all items, to prevent over or understocking, to avoid obsolescence losses and to relate stock quantities with demand. Inventory cards are available to help attain these objectives which give the status of inventoried items at a glance.

The final section of Step 3 involves reports of maintenance results. The preparation requires a certain amount of clerical time, but experience has proved that they are valuable not only for keeping posted on activities, but also as a yardstick by which to measure performance. Generally, the value and impact of such reports are lost unless the report is kept simple. A principal result of good reports is that they are of value in obtaining the proper budgets for maintenance.

Step 4, an evaluation of critical maintenance, calls for classifying equipment as to its importance to continued production. The "A" machines are those upon which production or the safety of employees depends. Another group includes units which can fail without endangering production or safety and which do not represent much capital or a rec-

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ognizable percentage of the total value of all machines. These are classified as "C" units. Between the two is a third group, "B" equipment, which represents some but not enough investment to qualify for "A" classification.

To obtain optimum results, "A" machines must have frequent attention and the very best plan of maintenance that can be devised. The "B" machines must have some attention, and the "C" equipment is entitled to little or no maintenance — attention only when it is available at little or no expense. After failure, however, "C" machines should be reconditioned completely for a new lease on life.

Once a decision has been made as to what machines should receive the best maintenance attention, it is necessary to determine the condition of each of these machines. Notations then should be made on the equipment record card about the condition of each unit. Any equipment not in first-class condition should be scheduled for early overhaul, and needed repair parts should be ordered. Steps then should be taken to insure that all equipment is kept in proper running condition.

Card Contains Pertinent Data

To obtain the facts that will help to make proper decisions, such pertinent information as the following should be included on the card: Age since latest overhaul; conditions of atmosphere and temperature under which the machine operates; number of hours per day in operation; condition of parts; and possible retirement or replacement date. It is necessary to determine the production time lost for planned overhaul (in days); the total downtime cost; the cost of planned overhaul to restore the unit to "A" condition; and the sum of all these considerations, or the total planned overhaul cost. The same card would show the production time (in days) that would be lost in the event of failure of a major part of the machine; the value of lost output associated with this failure; the cost of repairs and parts; and the total failure cost. Fig. 4 shows a proper method of evaluation of critical parts protection requirements for a particular machine.

Having determined which parts will give the most protection for the proper investment in operational insurance, one can embark on Step 5 and establish a critical maintenance program by ordering parts for long-time storage.

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fered the opportunity by the Apparatus Sales Division of General Electric Co. to attend productive maintenance forums designed to provide the basic facts of preventive maintenance. The first of 26 such forums was held in Cleveland on June 2. Its program included a tour of the organization's local service and manufacturing facilities, the showing of a sound-color movie on preventive maintenance and a series of talks which outlined a step-by-step approach to maintenance problems.

In conjunction with its productive maintenance forums, General Electric Co. has issued Bulletin GEA-6087, "Five Steps to Productive Maintenance," which is available from the company at Schenectady 5, N. Y. Following the completion of the series of forums, a sound-color film, "Productive Maintenance," will be available for showing at trade and association meetings. Upon request, General Electric maintenance specialists will assist in planning complete equipment surveys to analyze existing conditions, plan and schedule overhauls and guide the setting up of a working inventory control system.

To Dedicate Restoration Of Saugus Iron Works

The pages of history will be rolled back 300 years on Sept. 17 with dedication of the restoration of Saugus Iron Works, Saugus, Mass. The iron works, in operation from about 1646 to about 1670, has been referred to as the forerunner of a great industry and in many ways a prototype of American industry. It was, perhaps, the first foundry in the country.

Reconstruction and restoration of the iron works was begun in 1948 under the sponsorship of the First Iron Works Association and the American Iron and Steel Institute.

The project has provided an authentic restoration of the basic Saugus works of 1650 and includes the blast furnace, forge, rolling and slitting mill, raceway and power water wheels, and the receiving and shipping wharf and adjacent warehouse. The ironmaster's house and a temporary museum containing exhibits of iron works relics uncovered during excavations also are included in the restoration.

Six canvas panels showing essential operations of the iron works three centuries ago will be on display in the museum. Depicted are the making of charcoal, digging bog ore, casting hollow ware, forging wrought iron, making rods at the slitting mill and loading finished products into the company boat.

A 14-minute color documentary film, "The First Iron Works Restoration: A Tribute to Pioneers of American Industry," is available to groups for community or club showings by writing to American Iron and Steel Institute, 350 Fifth Ave., New York 1. Film is free except for transportation costs.

Ford Foundry Wins Award

Engine and Foundry Division, Ford Motor Co., Dearborn, Mich., has earned for the second time the award of honor for industrial safety presented by the National Safety Council. The award of honor is the highest of four awards for industrial safety. The award was presented in recognition of outstanding improvement in employee safety compared with the over-all automotive safety average and the division's previous three-year accident experience.

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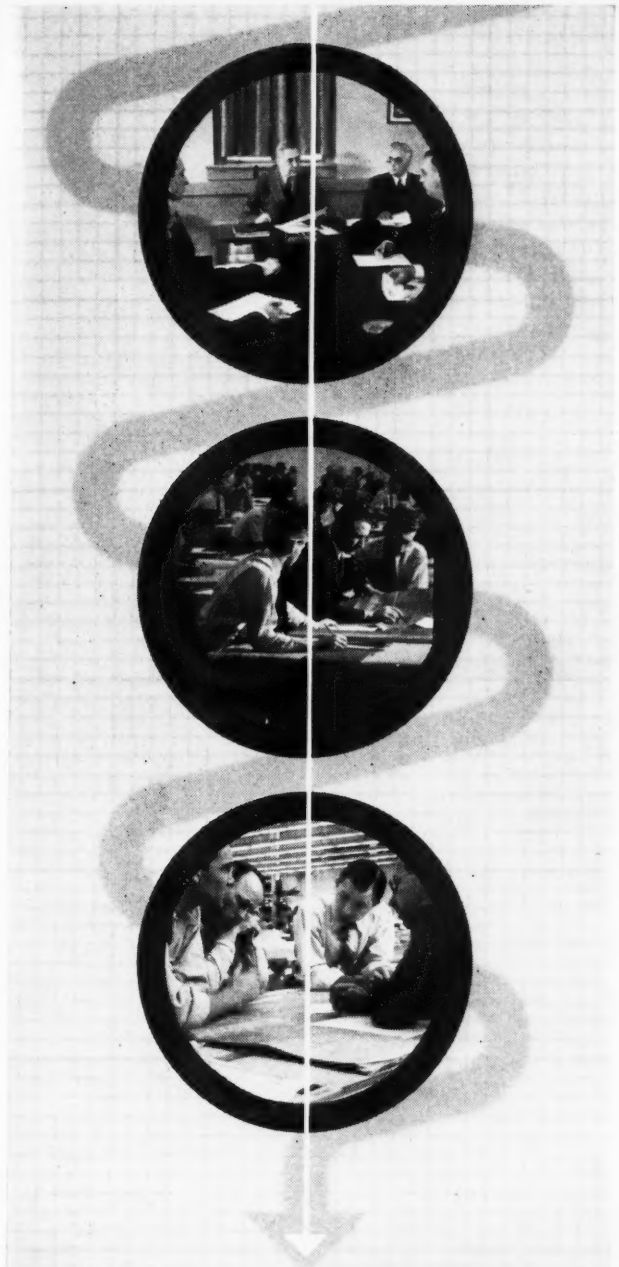

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will have, among others, the following articles in the September issue:

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- Machine Mobility—*Eduard A. Johnson*
- Remote Handling with Hydraulics —*Julius Kendall and Beal P. Moore*
- Feedback Control System—*Paul Lindholm*
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Malleable Modernization

(*Continued from page* 111)

the valves that are desired.

Pouring of molds on the roll-out system is performed approximately in the center of the several molding lines. Molten iron is transported from the air furnace in electrically driven, cab-operated 1500-lb ladles suspended from an overhead tramrail system. Iron from those is distributed to electrically operated 500-lb pouring ladles suspended from light cranes which span the area and move transversely to the line of travel of the conveyors.

After pouring, molds are pushed to the end of the conveyor lines and dumped onto an oscillating apron conveyor extending across the ends of the conveyor lines. The oscillating conveyor is about 3 ft wide and 120 ft long and transports castings and sand to a vibrating grid about 17 ft long which separates sand from castings. Sand drops through the grid and is elevated to either of two 150-ton storage tanks nearby. Castings move along the vibrating grid onto a chute and then through vibrating feeders are fed by an operator into perforated steel buckets (Fig. 3) to be transported to the cleaning and annealing department.

Conveyor Speed Is Variable

The steel buckets are suspended from a chain conveyor about 1500 ft long which is indicated as the "castings conveyor" line in Fig. 1. This conveyor travels aerially and underground (as indicated by the broken line), depending upon location, and extends in a continuous loop from a sprue chute or bin in the storage yard near the cupolas through the foundry and back again. The chain conveyor carries 183 buckets suspended on 8-ft centers, and the rate of travel may be varied from 4 to 32 ft per minute. Loaded buckets hold about 600 lb of castings and sprues. Hot castings and sprues from the roll-out line are cooled to handling temperature during a travel of about 1500 ft in approximately 1¼ hr and are dumped onto a large, chute-type sorting bench.

There the castings are separated from the sprues, inspected and distributed into tote boxes. Sprues are loaded into passing empty buckets and carried out to the storage yard. Tote boxes containing castings are transported to the trimming and inspection department for removal of excess fins, etc. Castings then are carried to the adjacent annealing department, stacked in annealing boxes and subjected to heat treatment. Although the firm at present employs powdered coal fired, batch-type fur-

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naces for annealing, it contemplates in the near future a complete revamping of the annealing department to bring it up to date.

Most recent step in the modernization program of Marion Malleable Iron Works was the completion of a car-type molding line shown in the upper left of Fig. 1. This department occupies a space approximately 224 ft long and 46 ft wide along the west side of the building. The conveyor line, in the form of a double loop, is about 875 ft long. With the exception of that section of the unit along which the molding machines and the pouring station are located, the conveyor line is completely enclosed in a sheet metal structure (Fig. 4). A powerful exhaust system removes all smoke and fume from the enclosure. In addition, an exhaust duct with adjustable side louvers is located along the pouring station to carry away all the smoke and fumes generated when the molds are poured.

Even though the molding machines and the pouring stations are located near a brick and steel-sash wall, adequate illumination is insured by installation of numerous fluorescent lights in the area. Similarly, the interior of the enclosure surrounding the mold conveyor is equipped with fluorescent lights to provide excellent illumination.

Conveyor Is at Work Height

The unit is equipped with 18 molding stations, as depicted in Fig. 1, on the west side and at the north end of the building. Machines are located over an underground tunnel covered with open grids. Spill sand falls through the grids onto a conveyor belt that discharges to a cross belt from the shakeout, which carries it to the storage tanks. Conveyor line is about 24 in. above the floor level, a height which makes it quite convenient for the machine operator to place his mold in position with minimum stooping and fatigue. Since that height is inconvenient for most suitable pouring conditions, the floor level is raised in the pouring area (Fig. 5) so that the top of the cars on the conveyor are level with the floor. Transition between the two levels is accomplished with a ramp.

One of the features of the molding line unit is the arrangement for automatically setting and removing weights on the molds. Weights are pivoted in the horizontal plane between two members of an A-shaped steel frame suspended from a chain which is attached to an overhead chain conveyor. Suspension is such that the pivoting axis is parallel to and in the center of the line of travel of the conveyor. Pivoting axis of the

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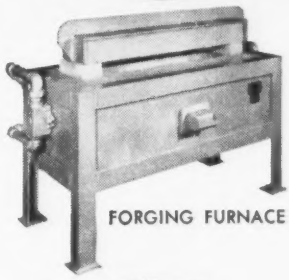
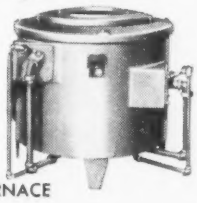
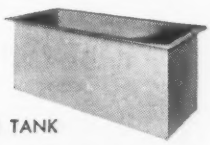


FORGING FURNACE



POT FURNACE



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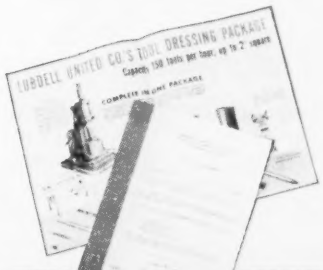

A copy of LOBDELL's new "Tool Dressing Package" Bulletin will give you further details.

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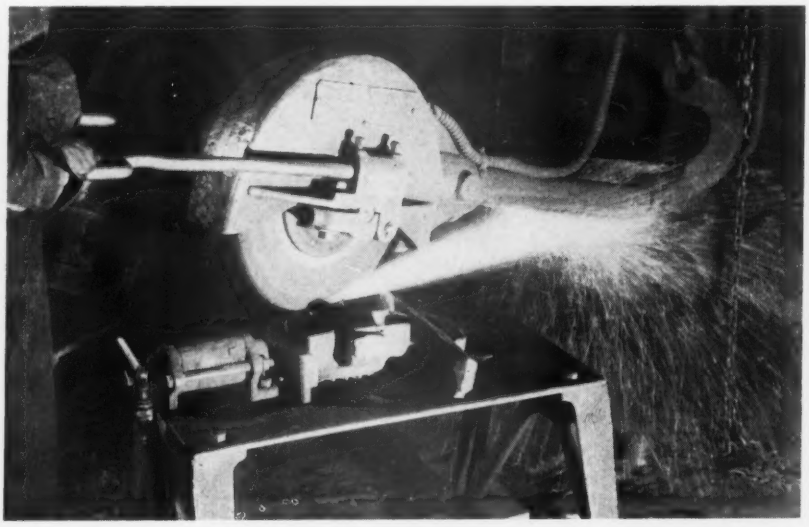


Improved air-powered casting holding device grips the casting for swing grinder in snagging operation. Photo courtesy Joy Mfg. Co., Pittsburgh

Holding Castings for Cleaning

By JOHN E. HYLER

CASTING cleaning and grinding operations have been greatly facilitated in many foundries through use of improved holding devices. Power-operated vises often are employed for chipping and cleaning. If castings can be held at bench level for cleaning, either air-powered or hydraulic vises may be used to advantage.

Closing and opening of such vise jaws can be controlled by a foot pedal, leaving both hands free to lift and position the castings, as well as to unload them from the vise. Some hydraulic vises, used considerably for this purpose, incorporate a safety valve as protection against overloading. One advantage of a hydraulic vise is that vibration from an air hammer (when a pneumatic chipping tool is used as a right above) will not cause the vise jaws to loosen.

One effective device used to hold medium-sized castings of irregular shape for snagging operations, provides maximum safety. Often referred to as a casting grip, it is an air-powered device used frequently with swing grinders, as shown at the left above. It eliminates insecurity and danger present when sand boxes are used to hold castings. This casting grip is mounted on top of a stand, which holds it (together with a casting mounted in it) at comfortable working level for use with a swing grinder. In some cases such a casting grip has been found to increase cleaning capacity materially. Working faces of the jaws are internal vees, or arcs, and contain large, vertical serrations, so that various forms of castings may be gripped solidly.

Foot pedal operates a vise holding part. Photo courtesy Columbian Vise & Mfg. Co., Cleveland

weights is about in the center of gravity so that they remain substantially in a horizontal plane. The weight system is arranged so that when two molds are on a car, weights for each in the proper location are available. If only one large mold is placed on a car, it is set in the center, and a single weight is used.

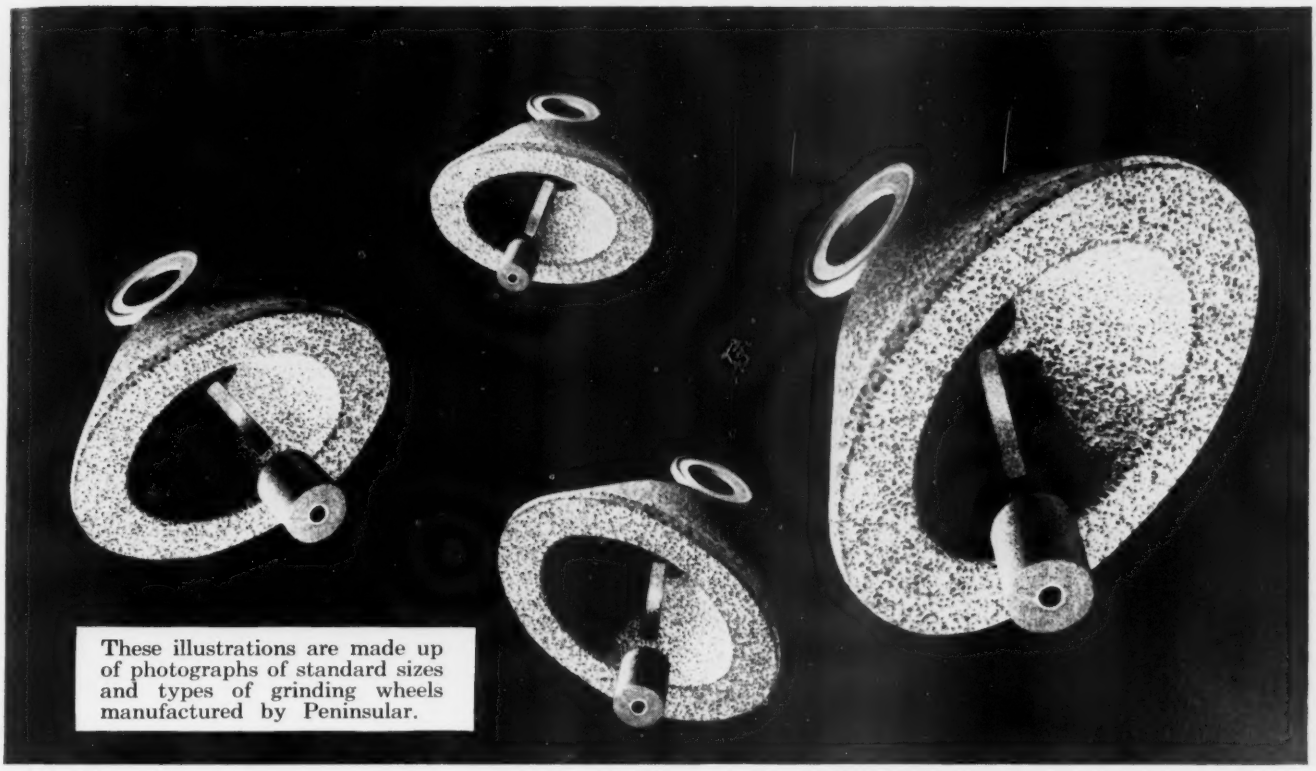
Rates of travel of the chain conveyor of the weight system and of the mold conveyor system are coordinated so that the two conveyors move in unison. At the start of the weight setting system, the weights are suspended about a foot above the tops of the molds. They gradually descend until they rest firmly on the mold tops. At the end of the pouring zone, the weights gradually ascend and travel around the loop to the starting point for another cycle.

After the molds have been poured, they enter the enclosed area and cool as they slowly traverse the double loop. At the north end of the second loop, molds are dumped automatically by a pneumatically operated device which tilts the hinged top of the car about 45 degrees. Thereupon the molds slide off onto a vibrating grid shakeout. Bottom boards are restrained from sliding off the car top by a stop strip along the side of the tilting section. The shakeout grid is located below the floor level and within the enclosure housing the conveyor line so that all smoke, dust and fumes are carried away. Castings are separated from the sand and raked into one of the steel buckets on the previously described castings conveyor system and are transported to the cleaning and grinding department.

Sand from the shakeout grid drops onto a conveyor belt below floor level which carries it in a northwesterly direction for about 60 ft to the sand storage tanks in the sand preparation department. At the end of that travel, the sand passes over a magnetic pulley that removes any

(*Continued on page* 278)

A 4-BELL PICTURE!



These illustrations are made up of photographs of standard sizes and types of grinding wheels manufactured by Peninsular.

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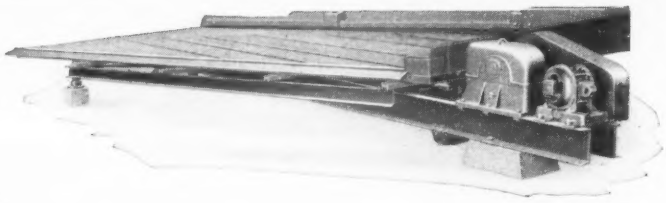

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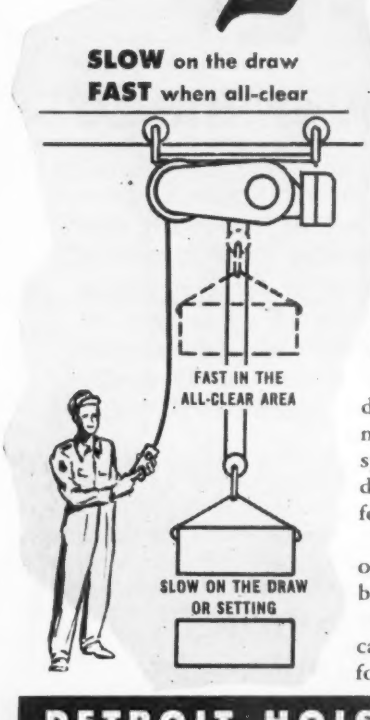
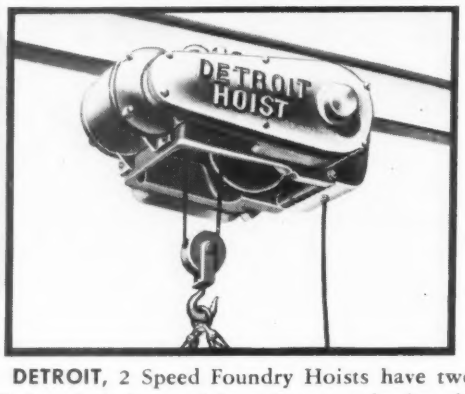
2 Speed HOISTS for FOUNDRIES





DETROIT, 2 Speed Foundry Hoists have two distinct hoisting and lowering speeds that do not vary with the amount of load—a very slow speed for setting or parting molds or any other delicate operation, and a time-saving, high speed for use in all-clear areas.

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(*Continued from page* 276)

tramp iron and is elevated into the storage tanks. From those it is discharged into either of two 2000-lb capacity sand mullers. Control of the addition of moisture as well as the mixing time in the muller is by the same type of equipment mentioned earlier with reference to the sand conditioning in connection with the roll-out molding line.

Molten metal is delivered to the unit in 1500-lb capacity ladles transported on cab-type, electrically driven carriers from which it is distributed to 500-lb pouring ladles. At this point, mention should be made of the procedure used to handle molten metal at the tapholes of the air furnaces. As might be expected, the overhead tramrail system for transporting transfer ladles is joined so as to form one continuous loop, to facilitate the interchange of carriers when desired and to bring carriers and ladles to a central point for repair. However, with the molten metal transfer points at the two molding units practically at opposite ends of the foundry, in essence two metal distribution systems are in operation.

Develop Spout Attachment

With only one taphole available at the air furnace, considerable delay and interference was encountered from time to time when carriers from the two systems arrived at the same time to receive metal. Since only one track passes close to the furnace, one carrier had to wait some distance away while the other was filled with molten metal and switched around so that it was headed properly toward its delivery point. During the interval between the time one ladle was filled and the other was in position to receive metal, the taphole had to be closed.

To facilitate metal handling at the air furnace taphole and particularly to avoid the necessity of switching the carriers and their ladles back and forth, the firm developed a bifurcated spout attachment which is appended to the regular taphole spout. The spout attachment (Fig. 6), in the form of the letter **T**, extends out from the furnace about 4 ft, and ends of the legs are about 8 ft apart. It is pivoted in the center so that it may be tilted to the right or left as desired to fill an awaiting ladle. With that arrangement, the carriers come to the spout and, after the ladles are filled, travel on semicircular sections of track which reverse their directions. Then they continue to the respective transfer points on the two systems.

Cores in a wide variety of shapes and sizes are produced on the bench

and with coreblowers in a well-lighted core department (Fig. 7). Benches and coreblowers are located in the center of the room and arranged in two parallel rows with about 3 ft between them. Separation between the two rows is a passageway for wheelbarrows used to bring in core sand mixes for distribution to bench and coreblower hoppers. One of the rows contains benches for the accommodation of small cores. The other row contains nine large core-blowing machines. Cores are placed on racks and baked in any of 12 batch-type, recirculating gas-fired ovens.

Sand for the cores is mixed in either of two 1000-lb capacity mullers (Fig. 8) which are totally enclosed to eliminate the escape of any light materials or dust into the atmosphere of the mixing room. Sand used is termed a "4½-screen" type with an AFS fineness number of 65. Sand mix is composed of 850 lb sand, 5.61 lb of alkyd resin, 13 lb cereal binder, 1 qt kerosene and 3 per cent moisture.

Mixing procedure is to add the cereal to the sand and mull exactly 2 minutes; then the water addition is made and the mix mulled for 3 minutes. At the end of that period, liquid resin and kerosene are added, and mulling is continued for 2 minutes. Sand is discharged into box-type wheelbarrows and carried to the core-room.

Cores Have Good Properties

After nearly a year of experience with the alkyd resin binder, Marion Malleable Iron Works has found that the cores possess excellent properties for the type of castings it produces. Cores have a high surface hardness, are strong and have good collapsibility characteristics. Finer sand used provides a smooth interior in castings. Cores bake rapidly and in that way increase oven capacity.

The firm has a well equipped laboratory for conducting chemical, physical and metallographic examinations as well as for sand control. As mentioned earlier, incoming raw materials are tested as well as the outgoing product, and close control is maintained on melting and other operations to insure production of quality castings at an economical cost. As a further aid in that direction, the laboratory keeps a record of each casting on a file card (Fig. 9) giving complete data relating to production procedure from the time it is placed in the sand. The record contains a photograph of the casting to show the gating system and has information on dimensions of the various components, etc. When any changes are made, they are noted,

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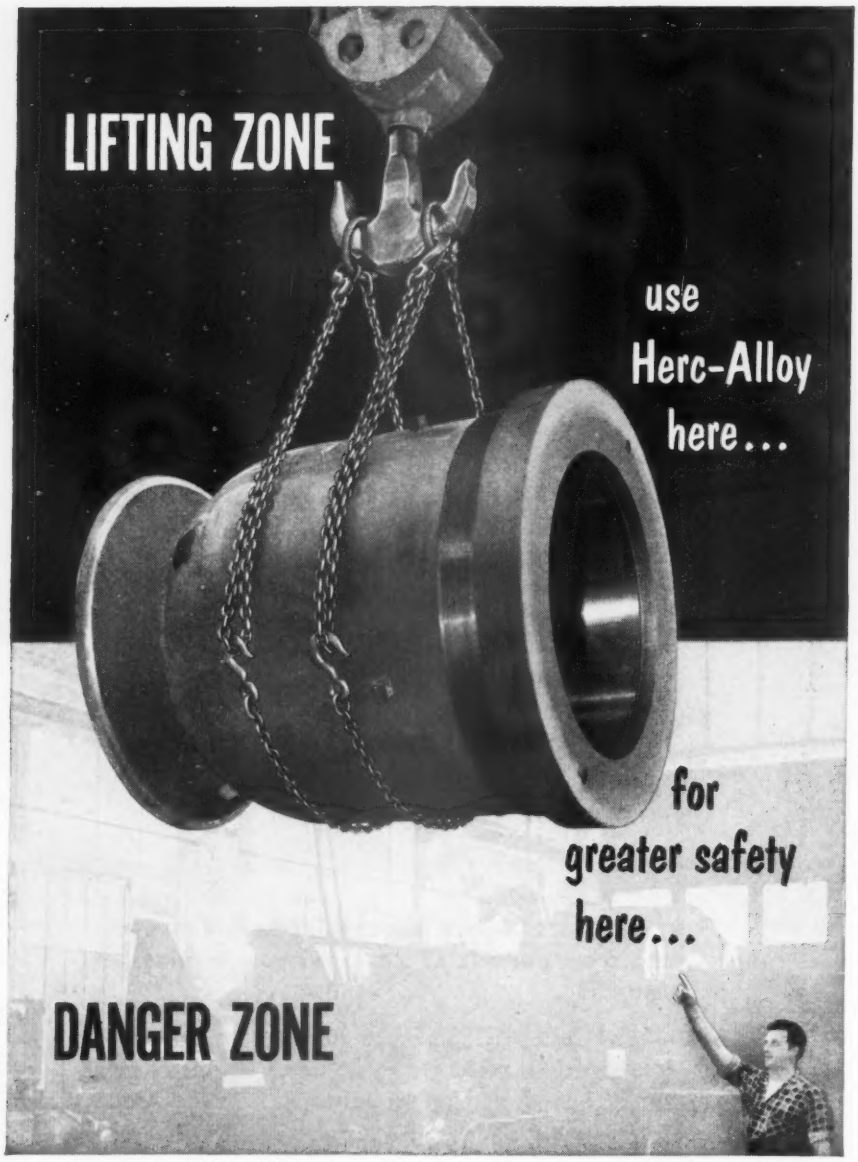

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with reasons for the changes.

This arrangement serves two purposes. First, when a pattern has been out of production for some time, it can be placed in the molding line with minimum difficulty since consultation of the record shows previous conditions and, hence, whether or not any adjustments are required with present conditions. Second, the arrangement permits minimum delay in designing suitable gating systems and determining molding procedure on new patterns since somewhere in the records information on a casting with similar characteristics is available to form the basis for predicating the methods to be followed.

Planning and active supervision of the modernization program of Marion Malleable Iron Works was under the direction of Samuel J. Walker, president, Chicago Railway Equipment Co., Chicago.

Welding Book Discusses Repair of Castings

American Welding Society has published a booklet, "Recommended Practices for Repair Welding of Cast Iron Pipe, Valves and Fittings," which gives practical details of repair methods which can be used as an economical means of reclaiming defective castings.

Materials covered include gray iron, white cast iron, chilled cast iron, malleable iron, alloy cast iron and nodular cast iron. The publication tells how to prepare a casting for welding and explains what post-weld heat treatments are required. The effects of welding on castings is described also.

Copies are available at 50 cents each from the American Welding Society, 33 West 39th St., New York 18.

Book Review

Standards, Part 1, *Ferrous Metals*, paper, 363 pages, 6 x 9 in., published by the American Society for Testing Materials, 1916 Race St., Philadelphia 3.

Contains extensively revised standards and tentative standards which have been accepted by ASTM since the appearance of the 1952 *Book of ASTM Standards*. Includes 10 standards and 52 tentatives. Of the former nine are replacements of former standards, and of the tentatives 42 are replacements and eight are published for the first time. The book also contains yellow stickers for affixment in the 1952 book to direct attention to changes in standards and tentatives.

TRADE PUBLICATIONS

For more details on these items use reply card—page 247

TEMPERING FURNACES: Advertising Department, Surface Combustion Corp., Toledo 1, O.—Bulletin SC-164 covers a complete line of furnaces for hardening and drawing or tempering operations. Included are direct-fired and controlled atmosphere furnaces of both the batch and continuous types
For More Details Circle No. 141—Page 247

SHELL MOLDING: General Electric Co., Chemical Division, Pittsfield, Mass.—Booklet illustrates the fundamental steps of shell molding and includes application studies and testing methods. The advantages of shell molding are listed together with a comparison of overlapping processes.
For More Details Circle No. 142—Page 247

MAGNESIUM MELTING: American Tank & Fabricating Co., 2284 Scranton Rd., Cleveland 13, O. — Folder covers 1200 to 6000-lb capacity crucibles for melting and alloying magnesium, 60 to 6000-lb capacity units for superheating and pouring and 40 to 850-lb crucibles for holding and ladling.
For More Details Circle No. 143—Page 247

AIRBLAST NOZZLES: American Wheelabrator & Equipment Corp., Mishawaka, Ind.—Catalog 27-A describes three standard models of airblast cleaning nozzles with a description of materials employed in the nozzles, and a discussion of how to control compressed air consumption.
For More Details Circle No. 144—Page 247

CRUCIBLE TONGS: Industrial Equipment Co., Minster, O.—Data sheet provides information about the company's line of cradle type crucible tongs and self-adjusting contact pads. Formula for measuring crucibles to order correct size tongs also is included.
For More Details Circle No. 145—Page 247

DESULPHURIZING: Solvay Process Division, Allied Chemical & Dye Corp., 61 Broadway, New York 6, N. Y.—The use of soda ash in desulphurizing molten metal is covered in an illustrated booklet. Advantages of desulphurizing and methods of soda ash application are given.
For More Details Circle No. 146—Page 247

STRAINER CORES: Williston & Co., Delta, O. — Properties of ceramic strainer cores available in seven standard sizes are described in folder.
For More Details Circle No. 147—Page 247

COPPER BASE CASTINGS: Pressco Casting & Mfg. Corp., Chesterton, Ind.—Features of pressure die, permanent mold, semipermanent mold and centrifugal casting of copper-base alloys are listed in booklet. Illustrated applications show advantages of company's processes. Complete specifications and comparison with other methods of production are included.
For More Details Circle No. 148—Page 247

BENTONITE: Magnet Cove Barium Corp., P. O. Box 6504, Houston 5, Tex.—Chemical analysis and sand bonding properties of western bentonite are given in bulletin.
For More Details Circle No. 149—Page 247

SAND BLOWERS: International Molding Machine Co., La Grange Park, Ill.—Photographs and drawings describe sand blowers adaptable for cores up to 75 lb.
For More Details Circle No. 150—Page 247

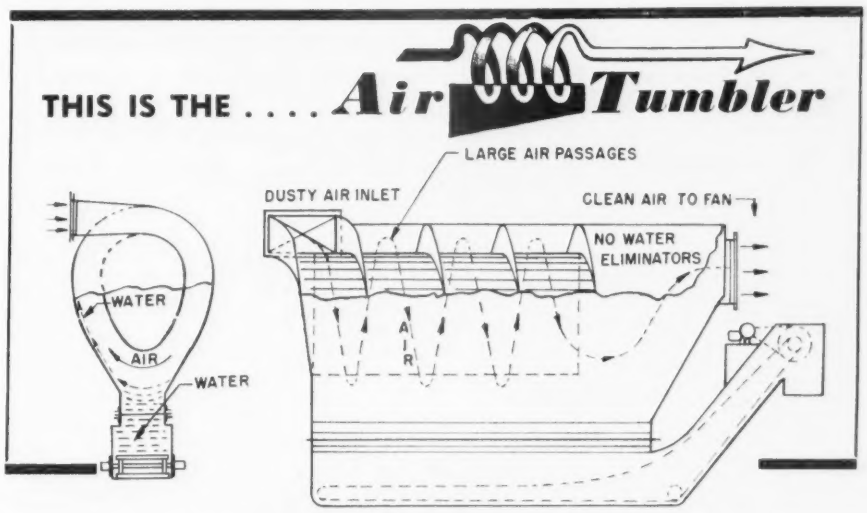
WET WATER: Aquadyne Corp., 441 Lexington Ave., New York 17, N. Y.—Booklet called "Foundry Wet Water Uses" describes the use of a water line connection and cartridges for making "wet water" as needed in sand conditioning, core mixing, cupola relining, dust control at the shakeout, walkways and other places.
For More Details Circle No. 151—Page 247

FOUNDRY INFORMATION: Whiting Corp., Harvey, Ill.—Bulletin FY-171 gives practical information on cupola operation and lining, electric furnaces, combustion, and several charts and tables of data pertaining to various foundry operations and equipment.
For More Details Circle No. 152—Page 247

CUT-OFF WHEELS: Raybestos-Manhattan Inc., Manhattan Rubber Division, Passaic, N. J.—Cut-off wheel bulletin includes recommendations with wheel grade numbers for a variety of materials. Operating suggestions for improved and faster metal cutting also are included.
For More Details Circle No. 153—Page 247

RAMMER BUTTS: Superior Rammer Products Co., 1434 Cuyler Ave, Chicago 13, Ill.—Rammer butts for core and mold work are designed to stay on the rammer shaft. Folder illustrates and gives dimensions of six styles.
For More Details Circle No. 154—Page 247

DUST CONTROL: Mechanical Industries Inc., 905 Grogan Bldg., Pittsburgh 22, Pa.—Bulletin details dust and fume control systems using a recirculating or parallel flow granule



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principle for removal of smoke, fumes, moisture, and for reclamation of by-products.

For More Details Circle No. 155—Page 247

EFFICIENCY TEST: Mercury Mfg. Co., 4044 South Halsted St., Chicago 9, Ill.—Folder entitled "Fork Truck Efficiency Test Tells When Corrective Measures Are Needed" gives necessary information to determine the condition of the fork truck being tested. Data indicate that preventive maintenance measures can save dollars in the operation of materials handling equipment.

For More Details Circle No. 156—Page 247

PATTERN BUYERS GUIDE: Master Pattern & Mold Co., 1313 Main Ave., Cleveland 13, O.—Pocket-size guide is designed to aid those faced with complex problems of purchasing adequate pattern equipment as a phase of product design or production engineering. Cover contains a slide chart which shows pattern recommendations by casting quantity requirements. Brief description also is given of the features found in cast iron, brass, aluminum and matchplate patterns, permanent molds, hardwood equipment, various grades of pine patterns, and green sand core molds.

For More Details Circle No. 157—Page 247

DESIGNATION CHART: Empire Steel Castings Inc., Box 139, Reading, Pa.—Bulletin 454-S designates specifications, analyses, physical properties and uses of a number of corrosion resistant and heat resistant stainless steels. It correlates the AISI type number and ASTM and SAE designations with company and ACI designations, so that users can identify the properties of castings.

For More Details Circle No. 158—Page 247

SPRAY GUN MOTION STUDY: Devilbiss Co., 300 Phillips Ave., Toledo 1, O.—Booklet presents an analysis of correct spray gun techniques which will enable the user to obtain maximum efficiency in production spraying operations. Simple illustrations point out recommended motions to follow in spraying various surfaces and shapes.

For More Details Circle No. 159—Page 247

REPAIR CEMENT: Smooth-On Mfg. Co., 570 Communipaw Ave., Jersey City 4, N. J.—Handbook shows methods for a wide range of repairs with the company's 12 repair cements for leaks in pipes, boilers, radiators, concrete and cinder blocks, sheet and plate metal. Physical data for each cement are offered.

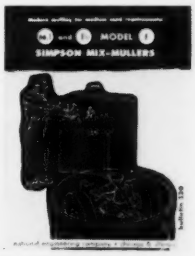
For More Details Circle No. 160—Page 247

ROOFING AND SIDING: Toledo Porcelain Enamel Products Co., 2275 Smead Ave., Dept. B, Toledo, O.—An enamel-on-steel roofing and siding material is described in brochure. Material is made from a corrugated steel base to which porcelain has been fused at 1550° F. It is claimed

to offer complete protection against fire, corrosive gases, moisture, steam, smoke, and salt air.
For More Details Circle No. 161—Page 247

TOOL SHAPE CHART: Metal Removal Co., 1546 North Orleans St., Chicago 10, Ill.—A 45 x 24-in. wall chart illustrates in actual size various shapes of the company's mounted points and carbide burr shapes. Three tables present data on tap drills, twist drills and steel wire gage, as well as decimal equivalents.
For More Details Circle No. 162—Page 247

SAND MULLERS: National Engineering Co., 549 West Washington Blvd., Chicago 6—Mullers for mixing sand in batches of 500 lb and 1000 lb are described in bulletin 520. Specifications cover the motor, discharge and drive mechanisms and lubrication facilities. Drawings are included which show space required for installation. Also described are a funnel for the addition of liquids, V-belt drive, mulling action, and safety features. Mullers for other operating conditions also are listed in the publication.



For More Details Circle No. 163—Page 247

RADIOGRAPHY LABORATORY: Allis-Chalmers Mfg. Co., 1032 South 70th St., Milwaukee, Wis.—Factors to be considered in planning and constructing a betatron industrial radiography laboratory are discussed in bulletin 31B8121. The bulletin describes and portrays features of the company's betatron laboratory.
For More Details Circle No. 164—Page 247

MOTOR SELECTOR: Reliance Electric & Engineering Co., 1088 Ivanhoe Rd., Cleveland 10, O.—Bulletin B-2102 lists performance characteristics, construction features, dimensions, price and other information on squirrel cage induction motors for applications ranging from 1 to 200 hp.
For More Details Circle No. 165—Page 247

INDUSTRIAL MODELS: Knight Models Inc., 600 West Jackson Blvd., Chicago 6, Ill.—Bulletin describes the use of three-dimensional industrial scale models to facilitate the design, layout and construction, and the rearrangements of full sized industrial plants.
For More Details Circle No. 166—Page 247

CORE OVENS: Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, O.—A complete line of foundry ovens is illustrated in bulletin 54. Shown are various types of core ovens, mold dryers, heat treating ovens, and auxiliary equipment.
For More Details Circle No. 167—Page 247

VIBRATION MOUNTINGS: Robinson Aviation Inc., Teterboro, N. J.—How to stop vibration, eliminate shock, reduce noise and cut down

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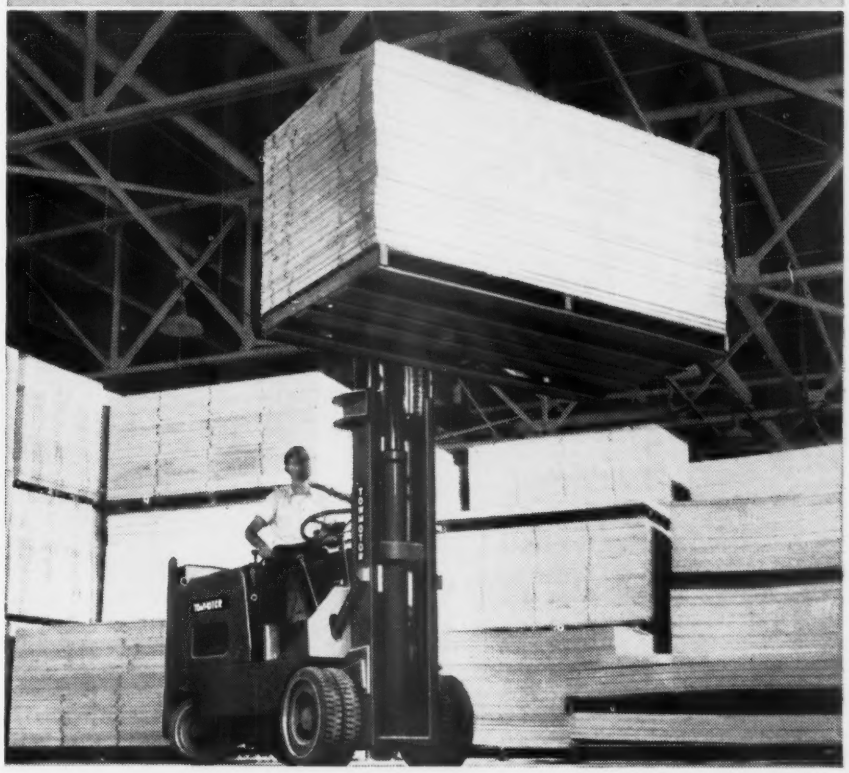

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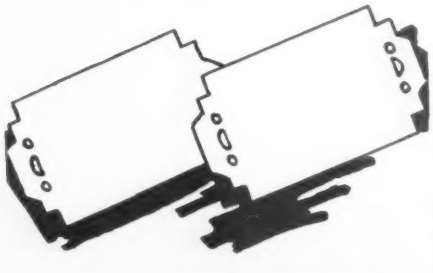

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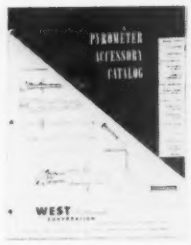
on the wear and tear of industrial machinery is the subject of booklet 850. Examples of industrial mounts using load-carrying cushions of knitted metal wire are given.

For More Details Circle No. 168—Page 247

MAINTENANCE MANUAL: Logansport Machine Co., Logansport, Ind.—Pocket-size manual in cartoon style points out correct and incorrect methods in setting up and servicing air and hydraulic equipment. Emphasis is placed on reasons for unsatisfactory performance and steps which can be taken to avoid such conditions.

For More Details Circle No. 169—Page 247

THERMOCOUPLE DATA: West Instrument Corp., 525 North Noble St., Chicago 22, Ill.—Indexed, illustrated, temperature control accessory bulletin uses examples and tables to provide quick-reference data to determine the type of thermocouple and protective tube needed for virtually any operation. Data are based on Instrument Society of America recommended practices. Stock record sheets are provided on the last two pages of the bulletin with provisions for listing the machine, thermocouple catalog number, description, previous purchase order number, and maximum, minimum and in-stock headings.



For More Details Circle No. 170—Page 247

MACHINE TOOLS: South Bend Lathe Works, 425 East Madison St., South Bend 22, Ind.—Catalog 5406 describes construction and features of a series of lathes, drill presses and other machine tools. This 58-page catalog includes diagrams showing the floor space required for the illustrated tools.

For More Details Circle No. 171—Page 247

COLLAPSIBLE CONTAINER: Republic Steel Corp., Advertising Division, 3100 East 45th St., Cleveland 27, O.—Folder 615 describes a lightweight, collapsible, returnable, steel shipping container designed to give maximum strength with minimum weight.

For More Details Circle No. 172—Page 247

CORE BLOWER: Redford Iron & Equipment Co., 20733 Glendale, Detroit 23, Mich.—Outstanding features of a stationary magazine type core blower with capacity for cores weighing up to 5 lb are given in bulletin.

For More Details Circle No. 173—Page 247

CRANE RUNWAY RAILS: L. B. Foster Co., 11 Park Place, New York 7, N. Y.—Specifications, schematic drawings and other engineering data are included in booklet.

For More Details Circle No. 174—Page 247

HOSE COUPLINGS: Hose Accessories Co., Le-Hi Division, 2700 North 17th St., Philadelphia 32, Pa.—Bulletin 6500 details a line of hose coup-

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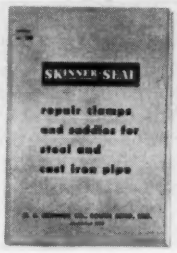
lings for various applications and how they can be used for the safe control of compressed air. Manufacturer claims the couplings can be engaged or disengaged in one-half second or less. A safety spring lock prevents accidental disengagement.

For More Details Circle No. 175—Page 247

TEMPERING: Leeds & Northrup Co., 4934 Stenton Ave., Philadelphia 44, Pa.—Photos and descriptions of typical installations, cut-away views of furnaces, descriptions of control instruments, and specifications about furnace sizes, work basket and trays for company's method of production tempering are given in catalog TD2-625.

For More Details Circle No. 176—Page 247

PIPE REPAIR CLAMPS: M. B. Skinner Co., South Bend, Ind.—The uses and specifications of repair clamps for steel and cast iron pipes are listed in catalog 54. Clamps for leaks in lines, welded joints, pipe joints, and collars are illustrated. Gaskets, saddles, patches, valve and bibb reseater, and bibb seat dresser are described in this 28 page catalog. Welding patches and pipe benders are included.



For More Details Circle No. 177—Page 247

HEAVY-DUTY FANS: Robbins & Myers Inc., Springfield, O.—Dimensions, applications and performance data on two types of heavy-duty industrial fans, drum and drumless types, are compiled in bulletin 650. Information concerning cooling and drying problems, system ventilation, and open surface tank ventilation also is provided.

For More Details Circle No. 178—Page 247

FUEL-FIRED FURNACES: Rust Furnace Co., Rust Bldg., 575 Sixth Ave., Pittsburgh 19, Pa.—Illustrated brochure on metallurgical furnaces describes the company's services to industry as designer-constructor of fuel-fired furnaces in the melting, reheating and heat treating fields.

For More Details Circle No. 179—Page 247

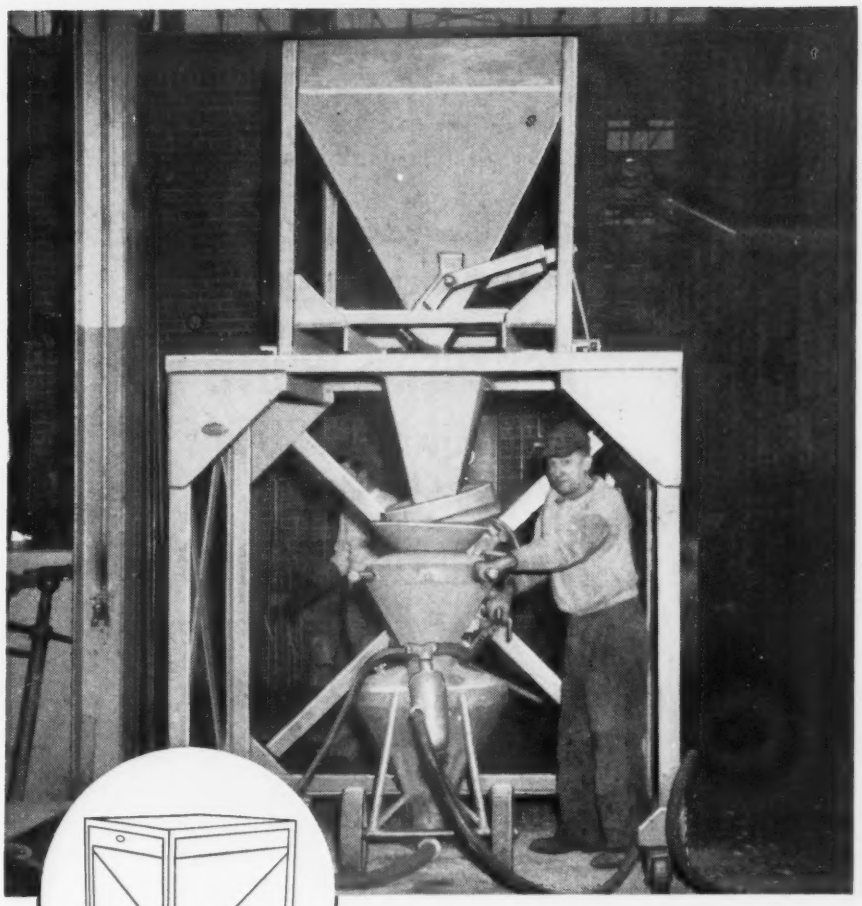
INDUSTRIAL RELATIONS: Cleveland Branch, National Metal Trades Association, 4500 Euclid Ave., Cleveland 3, O—Services available in organizing pay structures, training, and other phases of personnel and industrial relations are described in booklet

For More Details Circle No. 180—Page 247

REFRACTORIES: A. P. Green Fire Brick Co., Mexico, Mo.—Bulletin describes refractory brick, mortar, and castables. Technical data tables are included.

For More Details Circle No. 181—Page 247

OPEN HEARTHS: Illinois Clay Products Co., Barber Bldg., Joliet, Ill.—Charts and cross-sectional drawings provide recommendations for high temperature insulation in open



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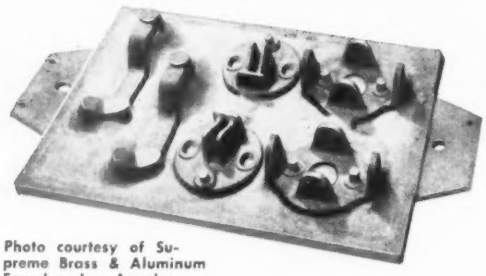

Photo courtesy of Supreme Brass & Aluminum Foundry, Los Angeles, Calif.

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hearth furnaces. Thermal comparisons are tabulated showing Btu savings for insulated refractories as compared with noninsulated refractories.

For More Details Circle No. 182—Page 247

EXHAUST HOODS: American Air Filter Co., Louisville, Ky.—Bulletin 270-E2 illustrates various designs of exhaust hoods engineered for many operations in the foundry industry including shakeout, sand handling, abrasive cleaning, metallic grinding, and melting operations.

For More Details Circle No. 183—Page 247

DRYER-COOLER: Link-Belt Co., 307 North Michigan Ave., Chicago 1, Ill. — A dryer, cooler, or dryer-cooler unit suitable for handling sand is covered in book 2511. The unit is described and the manner in which it performs each of its functions is explained. A section of the book covers the principles of drying and cooling and the fundamental physical laws of heat transfer as the basis for each function of the unit. Other sections cover temperature and dust control, dimensions and typical layouts, photographs and a psychrometric chart.

For More Details Circle No. 184—Page 247

METALS RESEARCH: Metals Research Dept., Armour Research Foundation, Illinois Institute of Technology, 3350 South Federal St., Chicago 16, Ill.—Brochure, summarizing facilities available for metals research, includes chart on co-operative method of attacking research problems.

For More Details Circle No. 185—Page 247

FOUNDRY EQUIPMENT: Simplicity Engineering Co., Durand, Mich.—Catalog F-7 describes shakeouts, sand screens, various types of sand conditioning equipment, and conveyors used in various foundry applications.

For More Details Circle No. 186—Page 247

GRINDERS: Fox Grinders Inc., Oliver Bldg., Pittsburgh 22, Pa.—Booklet includes specifications of swing frame cut-off machine, designed to take advantage of flexible cut-off wheels, swing frame grinders, and stand grinders.

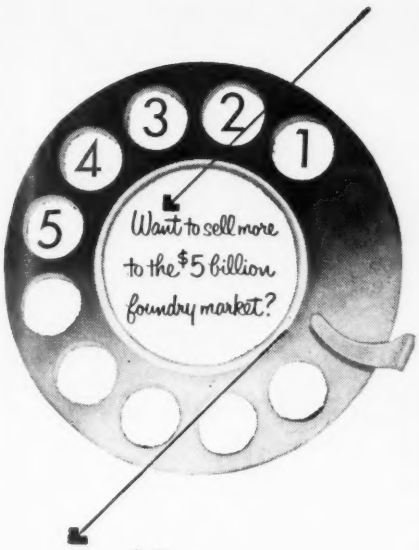
For More Details Circle No. 187—Page 247

WORK PLATFORMS: Ballymore Co., Wayne, Pa.—Folder contains information about all-steel portable and stationary platforms custom fitted for large equipment repair, production operations, maintenance, and other uses.

For More Details Circle No. 188—Page 247

CONTROL VALVES: Ross Operating Valve Co., 120 East Golden Gate Ave., Detroit 3, Mich.—Bulletin 101B includes drawings of the operation of air valves used in a variety of applications.

For More Details Circle No. 189—Page 247



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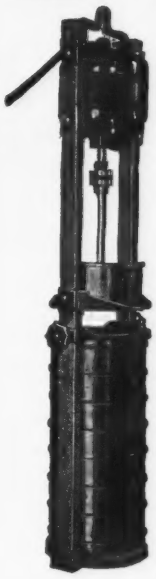

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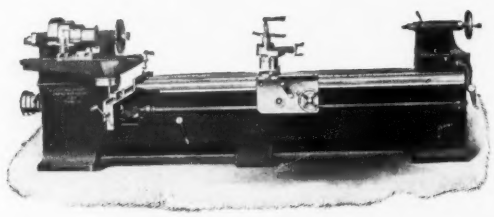

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NATIONAL CONTROLLED "T" SHOT AND GRIT IS PRODUCED EXCLUSIVELY BY

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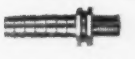

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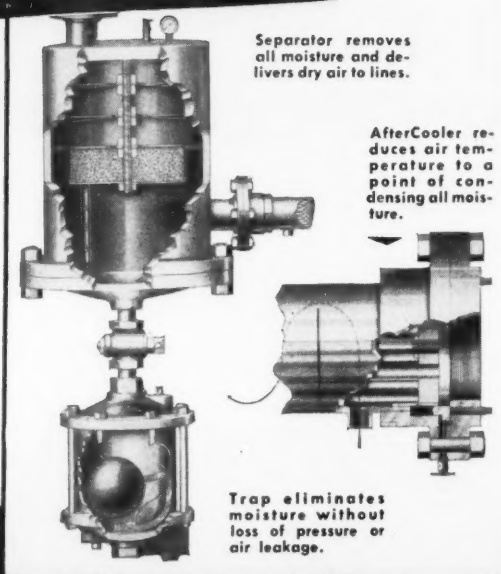
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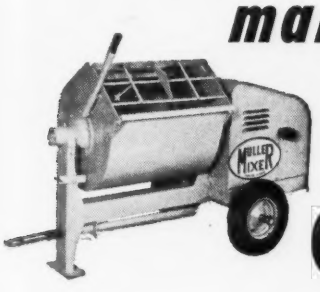

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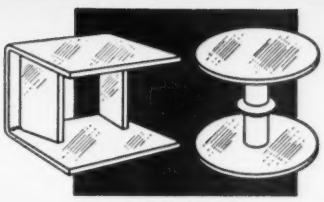

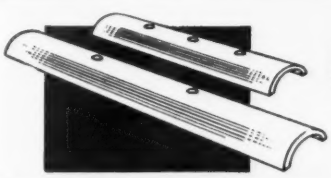

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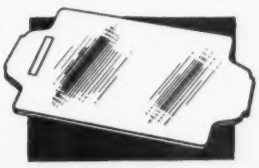

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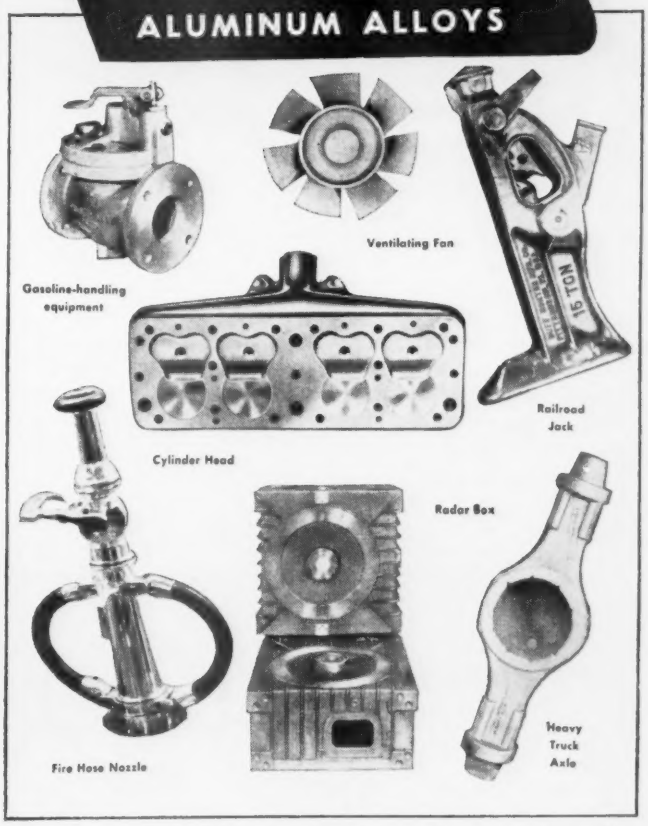

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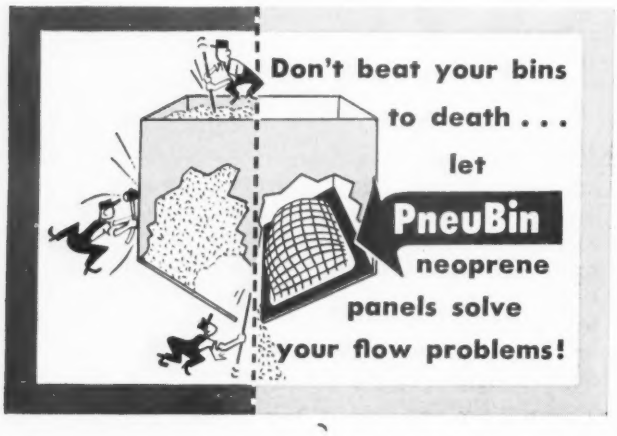
Because the neoprene panel is resistant to oils and most chemicals and is also thick and tough enough to withstand severe abrasive service, PneuBin is applicable to most any bin flow problem.



Sizes: PneuBin panels are available in 14 standard sizes, 4" to 24" wide, 6" to 72" long. Special sizes can be made if required in quantity.

Send for "Flow Stoppage Report" and free literature. PneuBin engineers will gladly make recommendations, with no obligations on your part.

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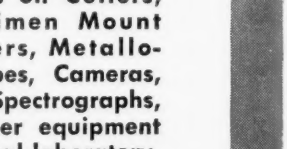

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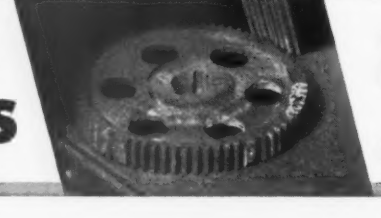

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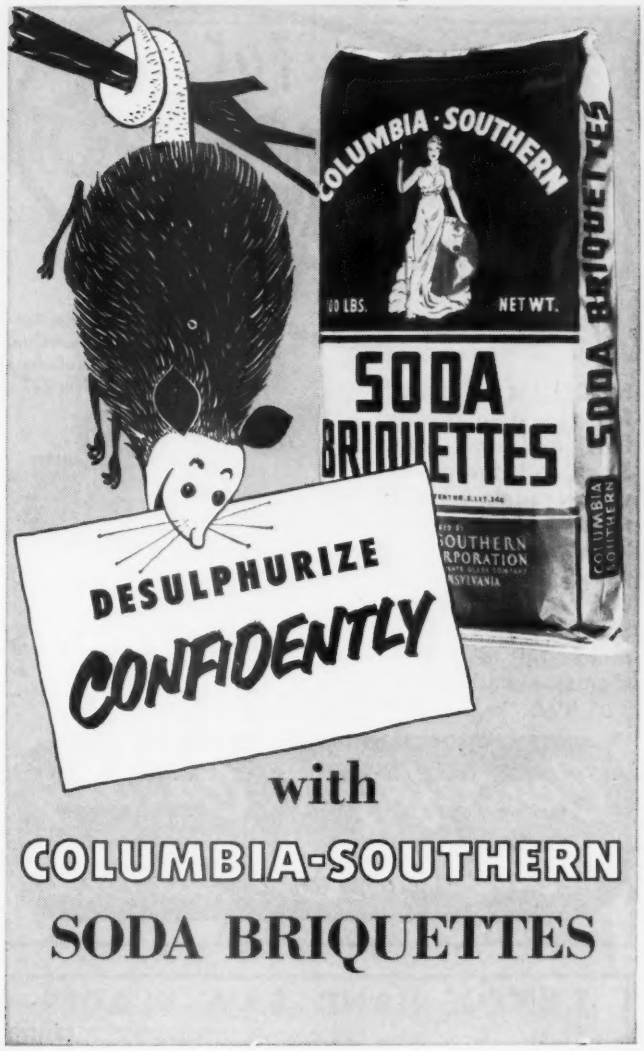

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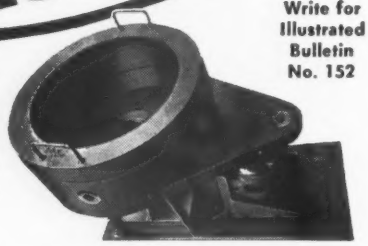

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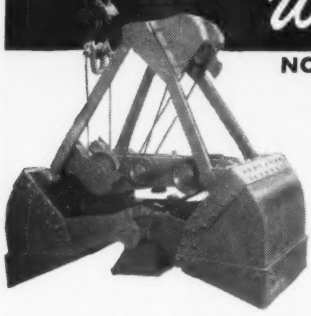

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6 inches	85.50	79 00	72.50	66.00
7 inches	97 50	90.00	82.50	75.00
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Real opportunity working for malleable foundry in Michigan. Must be willing to spend 50% of time traveling. Foundry background necessary requisite. In reply state age, resume of experience, education, and salary desired. Address: Box 253, FOUNDRY, Cleveland 13, Ohio.

FOUNDRY FOREMAN

To take charge of jolt roll-over machine production in well equipped Northwestern Pennsylvania gray iron foundry. Work is of semi-production and jobbing nature. Require an experienced man under 40 years to handle approximately 25 men. Write details of personal and practical background and salary expected. Address: Box 283, FOUNDRY, Cleveland 13, Ohio.

Help Wanted

SALES ENGINEER

We have an opening for a young man with technical education who has had a few years actual experience in the foundry industry. Prefer a graduate engineer. A fine opportunity for an aggressive young man. Apply in writing stating qualifications and salary expected.

W. E. NIEMACKI,
MINNEAPOLIS ELECTRIC STEEL CASTINGS COMPANY
3800 N.E. 5th STREET
MINNEAPOLIS 21, MINN.

SALES ENGINEER AND MACHINE DESIGNER

BOTH TO BE FAMILIAR WITH MOLDING MACHINE APPLICATION

A midwest manufacturer has an excellent opportunity for two men with the right qualifications. Give complete abstract of education and experience and state salary desired.

BOX 255
FOUNDRY CLEVELAND 13, OHIO

PRODUCTION MANAGER

Modern, medium-sized steel jobbing foundry requires experienced Production Manager to take charge of production department. Must be experienced in production scheduling, follow-up and customer relations. The right man can look forward to a permanent career with a progressive, expanding organization in the Metropolitan New York Area. Address: Box 284, FOUNDRY, Cleveland 13, Ohio.

Help Wanted

METALLURGIST

For key job modern iron and steel production foundry.

Must have production and research experience. Able to direct foundry metal-control operations and research.

Age: under 40.

Exceptional opportunity for aggressive, experienced metallurgist.

Apply giving particulars including education, age, experience, references, how soon available, and salary expected.

BOX 291
FOUNDRY CLEVELAND 13, OHIO

FOUNDRY SUPERINTENDENT

Gray iron job shop, located in Minneapolis-St. Paul area; prefer man age 30 to 45 years with successful supervision experience in all phases of gray iron castings; permanent position; excellent opportunity; profit sharing. Address: Box 306, FOUNDRY, Cleveland 13, Ohio.

INDUSTRIAL ENGINEER

Position open with midwest gray iron and alloy iron jobbing foundry to assume charge of time study, incentives, and methods engineering. Prefer man with pattern shop experience. If interested state age, detail of experience, and salary desired. Address: Box 273, FOUNDRY, Cleveland 13, Ohio.

Help Wanted

BRASS FOUNDRY
FOREMAN

for

Established Midwest Firm
Minimum of fifteen years experience required, possessing a complete knowledge of foundry brass methods. Age 35 to 40. Salary Open.

BOX 281
FOUNDRY **CLEVELAND 13, OHIO**

PLANT ENGINEER

MUST HAVE EXPERIENCE IN STEEL FOUNDRY TO TAKE CHARGE OF BOTH CONSTRUCTION AND ALL MAINTENANCE. IN REPLYING GIVE COMPLETE INFORMATION WHICH WILL BE HELD IN STRICT CONFIDENCE BY A SINGLE EXECUTIVE.

BOX 293

FOUNDRY **CLEVELAND 13, OHIO**

STEEL FOUNDRY SUPERINTENDENT

700 ton capacity Foundry in Illinois requires general superintendent for foundry, grinding room and pattern shop. Graduate engineer—age 40 to 45 preferable. Foundry operation experience desired. Give complete history, references and salary expected.

BOX 280
FOUNDRY **CLEVELAND 13, OHIO**

FOREMAN
BRASS FOUNDRY

To run small midwest mechanized foundry, producing brass plumbing castings. Thoroughly experienced in efficient core blowing, melting, pouring, sand control, and molding methods. Technical metallurgical and practical background important. Tell us about yourself and salary expectations. Our organization knows of this ad.

BOX 287
FOUNDRY **CLEVELAND 13, OHIO**

METALLURGIST

Established Eastern foundry has opening for qualified metallurgist thoroughly familiar with cupola-air furnace duplexing of malleable iron to take complete charge of melting gray and malleable iron. State age, experience, salary desired.

BOX 301
FOUNDRY **CLEVELAND 13, OHIO**

FOUNDRYMAN

Young man in large construction casting foundry. Must have sand and metal control experience. Foundry engineering experience also helpful. Eastern location with opportunity for advancement. Address: Box 286, FOUNDRY, Cleveland 13, Ohio.

FOUNDRY SUPERINTENDENT

Thorough knowledge and experience in all phases of nonferrous castings. Must be able to handle production of all types of nonferrous castings. Must understand gating, jobbing, floor and machine work. Salary and bonus commensurate with ability. Address: Box 282, FOUNDRY, Cleveland 13, Ohio.

Positions Wanted

MANAGER OR SUPERINTENDENT

Thirty-five years' practical experience in foundry, molder eighteen years. Have been foreman, superintendent and general manager. Did consultation work in various foundries. One was losing $7,000 per month when I started, in seven months it was making good money. Ran three largest foundries in St. Louis, largest one in Chicago. Understand gray iron, semi-steel, brass, aluminum. Know how to rig jobs to get best production at lowest cost. Understand running of cupola mix of various metals; estimating jobs from blueprints. Can give best of references. Available immediately. Address: Box 269, FOUNDRY, Cleveland 13, Ohio.

STEEL FOUNDRYMAN

Supervisory capacity with twenty years' experience in all phases steel foundry. Producing steel castings ranging from one pound to three tons. Good knowledge of foundry equipment, foundry methods and mechanized production. Familiar with heading and gating and rigging of patterns for machine production. Also sand control. Married. Age 47. Address: Box 268, FOUNDRY, Cleveland 13, Ohio.

GENERAL MANAGER

Mature, profit-minded, aggressive. Successfully managed five companies—three taken out of the red. Trained two successors, both made good. Qualified to carry complete administrative responsibility and develop all profitable possibilities. Excellent experience foundry, machinery and related lines. Address: Box 297, FOUNDRY, Cleveland 13, Ohio.

FOUNDRY ENGINEER

Do you have trouble in determining correct and economical foundry procedures to eliminate scrapped castings? Is your foundry layout such as to obtain maximum production of salable castings with minimum expenditure or manpower and other costs? Metallurgical foundry engineer is available who has had long experience in the positive correction of facilities, casting design, molding and metal melting techniques and is capable of installing and taking full charge of a department to accomplish these ends. Address: Box 294, FOUNDRY, Cleveland 13, Ohio.

PATTERN SHOP FOREMAN

Twenty-seven years experience in capacity of pattern-maker and checker and during past 12 years as a shop foreman in a steel foundry handling large and small work in all its phases. Best of references, age: 55. Address: Box 288, FOUNDRY, Cleveland 13, Ohio.

PATTERNMAKER

Progressive, energetic, wood and metal. Age 38. Extensive practical foundry experience for production and jobbing. Know core blowing and drying. Set up and operated pressure cast matchplate shop. Worked shell molding. Address: Box 289, FOUNDRY, Cleveland 13, Ohio.

FOUNDRY EXECUTIVE

Iron or steel, seventeen years in management with experience in sales, labor relations, Production and particular emphasis on metallurgy, melting, heat treating, sand control, rigging and methods. Presently employed. Address: Box 305, FOUNDRY, Cleveland 13, Ohio.

METALLURGIST

B.S. Degree. Age 29. Five years' experience with aluminum casting alloys, including research, production service engineering. Well acquainted with other nonferrous casting alloys. Experience in quality control, radiography, heat treating and physical testing. Desire position in foundry industry or sales service engineering. Excellent record. Address: Box 254, FOUNDRY, Cleveland 13, Ohio.

YOUNG FOUNDRYMAN

Practical man with on-the-job technical training in high production shops, would like position in an aggressive organization. Experienced and thoroughly trained in all phases of foundry operation and management. Employed and will relocate immediately. Address: Box 303, FOUNDRY, Cleveland 13, Ohio.

METALLURGICAL SUPERVISOR

Semi-retired, age 61, healthy, active and conscientious. Well educated. Forty years' experience in experimental and production foundries, covering melting and processing of ferrous castings, including ductile iron. Available part or full time. Pittsburgh district preferred. Salary secondary. Address: Box 302, FOUNDRY, Cleveland 13, Ohio.

Positions Wanted

EXECUTIVE

Experienced in all phases of foundry operation and management with thorough knowledge of each shop process, engineering, metallurgy, cost estimating and accounting, sales and industrial relations. Technical graduate. Excellent recommendations. Address: Box 239, FOUNDRY, Cleveland 13, Ohio.

FOUNDRY ENGINEER

"Do you wish to lower your foundry cost? From an executive observation?" If so allow me to analyze your over-all manufacturing set-up. Address: Box 263, FOUNDRY, Cleveland 13, Ohio.

PRODUCTION MOLDING
FOREMAN

Desire position as molding foreman in gray iron foundry. Practical experience all phases foundry practice. Age fifty. If you need quality castings economically, then contact me. Address: Box 296, FOUNDRY, Cleveland 13, Ohio.

FOUNDRY FOREMAN
OR SUPERINTENDENT

Well versed in jobbing or production work. Green or dry sand, cupola and sand control. Twenty-five years experience. Last fourteen years in supervisors capacity. Two years M.I.T. Age 42. Married. Address: Box 298, FOUNDRY, Cleveland 13, Ohio.

MEEHANITE FOUNDRYMAN

Desire position as foreman or supervisor, twenty-five years experience in production or jobbing work, green and dry sand. Fifteen years as foreman and assistant superintendent. Married. Age 42. Address: Box 299, FOUNDRY, Cleveland 13, Ohio.

CASTING ENGINEER
CUSTOMER CONTACT

M.E. with 20 years ferrous experience covering design, pattern, foundry, machining, inspection and customer contact, desires permanent connection with progressive concern. Address: Box 290, FOUNDRY, Cleveland 13, Ohio.

FOUNDRYMAN

Superintendent or general foreman. Practical man. Twenty-seven years' experience in gray iron and nonferrous jobbing and high production shops. Now employed. Western or central New York preferred but not essential. Address: Box 295, FOUNDRY, Cleveland 13, Ohio.

FOUNDRY EXECUTIVE

Thoroughly experienced in the management of gray iron production or jobbing foundries. Qualified to show you a highly efficient and low cost operation. If you are interested, Address: Box 214, FOUNDRY, Cleveland 13, Ohio.

SUPERINTENDENT OR
GENERAL FOREMAN

Large or small castings in gray iron or nonferrous, green or dry sand. Twenty years' practical experience in all foundry details. New Jersey. Address: Box 292, FOUNDRY, Cleveland 13, Ohio.

GENERAL COREROOM FOREMAN

Jobbing or production coreroom, large or small work. Good rigger for coreblowers, rollover machines, bench, floor work. Well versed in sand control, drying and assembling of cores. Cost and production minded. Address: Box 300, FOUNDRY, Cleveland 13, Ohio.

YOUR CLASSIFIED ADVERTISEMENT IN FOUNDRY BRINGS RESULTS!

IT COSTS BUT LITTLE WHY NOT RUN AN ADVERTISEMENT ABOUT YOURSELF IN TWO OR THREE ISSUES?

WRITE

FOUNDRY

CLASSIFIED ADVERTISING DEPT.

PENTON BLDG., CLEVELAND 13, OHIO

CLASSIFIED ADVERTISING

Employment Service

FOUNDRY PERSONNEL SPECIALISTS
National Placement and Procurement of

GENERAL AND PLANT MANAGERS, PLANT SUPERINTENDENTS, FOREMEN—ALL DEPARTMENTS, METALLURGISTS, ENGINEERS, CONTROLLERS, ACCOUNTANTS, SALESMEN, SALES MANAGERS, PERSONNEL DIRECTORS, PURCHASING AGENTS.

Confidential Inquiries Invited
From Employers and Qualified Applicants.

For Fast Competent Assistance Contact

JOHN COPE, DIRECTOR **37 S. WABASH, CHICAGO 3, ILL.**
IMPERIAL PERSONNEL **FRANKLIN 2-4233**

SALARIED PERSONNEL
$3,000-$25,000. This reliable service, established 1927, conducts confidential negotiations for high grade men who seek a change of connection under conditions assuring if employed full protection to present position. Send name and address only for details. Personal consultation invited. Address: JIRA THAYER JENNINGS, 241 ORANGE STREET, NEW HAVEN 10, CONN.

Representatives Wanted

SALES REPRESENTATIVES WANTED
America's Largest Dealer in Used and Rebuilt Foundry Equipment is now looking to establish representatives in each of the 48 States. Prefer men now calling on the foundry industry with established customer relations. Excellent opportunity.

BOX 310
FOUNDRY **CLEVELAND 13, OHIO**

SALES REPRESENTATIVES WANTED
Aluminum Permanent Mold foundry wants qualified casting salesmen. Commission basis. Prefer man with established customer relations. Address: Box 285, FOUNDRY, Cleveland 13, Ohio.

OPPORTUNITY
Bright future for right man experienced in selling foundry supplies and equipment. Long established firm in Los Angeles, California. Write full details. Address: Box 225, FOUNDRY, Cleveland 13, Ohio.

Wanted-To-Buy

WANTED TO BUY

1—Good used gas fired Circulating Rack Type Core Oven. 8' wide x 7' high x 12' long.

THE TREATY COMPANY
GREENVILLE, OHIO
PHONE LD30

MACHINERY WANTED
Induction Furnaces, Screens, Simpson Mixers, Riehle Compression Testing Machines, Pulverizers, Grinders, Conveyors. Address: CONDENSER SERVICE & ENGINEERING CO., INC., HOBOKEN, NEW JERSEY, BA 7-0600.

WANTED
Electric furnace for melting cast iron, 1000 lb. to 1500 lb. cold charge, complete with motors, controls and transformer. State age, condition, model, voltage and price. Address: Box 307, FOUNDRY, Cleveland 13, Ohio.

MIXERS WANTED
Used Simpson Intensive Sand Mixers. State size, condition and lowest cash price or immediate acceptance. Address Box 578, FOUNDRY, Cleveland 13, Ohio.

Foundry Work Wanted

FOUNDRY WORK WANTED
We are now open for outside work. We specialize in aluminum "pressure tight" castings, machine castings, and face work. Address: VICKSBURG FOUNDRY, 124 NORTH ST., VICKSBURG, MICHIGAN.

Engineering Service

FOUNDRY TECHNICAL SERVICE
FOR
STEEL, MALLEABLE, AND GRAY IRON FOUNDRIES

Expert assistance is offered to reduce scrap and costs; to establish sound, stable foundry practices, thus improving service to customers.

INQUIRIES ARE SOLICITED.

HERBERT F. MILLER, CONSULTANT
FOUNDRY ENGINEERING SERVICE
718 WEST SECOND STREET
MARION, INDIANA

Foundries For Sale

FOUNDRIES FOR SALE

IRON FOUNDRY for rent. Complete modern equipment for light and medium jobbing work. Rent $200 per month. Equipment can be purchased on easy terms. Located near Boston. GRAY IRON and nonferrous foundry producing castings up to 5 tons. Daily capacity 25 tons. Good Highway and rail facilities. Eight acres. Small eastern town. Owner willing to stay as manager.

EDWARD H. ZOLL

FOUNDRIES SOLD AND LEASED

790 BROAD STREET **NEWARK 2, N. J.**

GOING CONCERN

Equipped gray iron foundry, very fine customer list, good capacity, good labor available. Owner Company in Dissolution.

BAY TRUST COMPANY, RECEIVER
PHONE 3-7531
BAY CITY, MICHIGAN

GRAY IRON FOUNDRY
FOR SALE

Building two years old. Well equipped jobbing shop. Room for 14 molders—10 working now. Producing approximately 7 tons daily. Good labor relations.

BOX 309
FOUNDRY **CLEVELAND 13, OHIO**

SHELL MOLDING PLANT FOR SALE
Complete with all parts, machine, hoppers, pouring cars, etc. at big reduction from original cost. Can be seen in use. Everything in fine condition. Address: FINLEY MACHINERY COMPANY, VALDOSTA, GEORGIA.

Foundries For Sale

17,000 SQ. FT. FOUNDRY

FOR SALE OR LEASE

Gray Iron—Aluminum—Bronze

- 80' x 210' BUILDING
- ON 5 ACRES
- RAILROAD SPUR
- 6-TON CAP. CUPOLA
- 200 TONS PER MONTH

PRESENT OWNER WILL TAKE 25% TO 50% OF PRODUCTION

Present owner selling in order to concentrate on manufacturing. Ample business available to take up remaining 50% to 75% of production.

CONTACT: FRANK WHEATLEY, JR.

FRANK WHEATLEY PUMP AND VALVE MFR.

HALE STATION, SAND SPRINGS ROAD

TULSA, OKLAHOMA

FOR SALE
Brick and steel foundry, Southern Illinois, 160 x 320 feet, overhead monorail, water transportation available. Ideal for mechanized operation, contains equipment. Address: Box 200, FOUNDRY, Cleveland 13, Ohio.

For Sale

FOR SALE

TURBO BLOWERS WITH MOTORS

CFM	PRESS.	MAKE	CFM	PRESS.	MAKE
4500	16 oz.	G.E.	500	10 oz.	No.Am.
3500	40 oz.	Spencer	400	16 oz.	Spencer
2800	1 oz.	Spencer	400	4.3 oz.	Spencer
2700	16 oz.	Spencer	340	20 oz.	A-B
2500	7 oz.	Sturt.	320	12 oz.	Spencer
2000	2½ oz.	Spencer	225	16 oz.	Spencer
2000	1 oz.	Spencer	180	15 oz.	Spencer
1300	16 oz.	Spencer	110	16 oz.	Spencer
1150	20 oz.	No.Am.	9000	6" SP	Northern
675	16 oz.	No.Am.	2344	2" SP	Clarage
660	20 oz.	A-B	1100	4½" SP	Bayley

THE MOTOR REPAIR & MFG. CO.
1552 HAMILTON AVE.
CLEVELAND 14, OHIO

FURNACES FOR SALE
Ten used heat treating furnaces and two 7-ton gantry cranes. Good condition, priced to sell. Address: BAER STEEL PRODUCTS, INC., BOX 1428, BOISE, IDAHO.

UNIVERSAL

Partial Listing of America's
LARGEST STOCK of GUARANTEED
EQUIPMENT

GUARANTEED EQUIPMENT

1—**WHITING** Cupola #6 w/vert. Skip Hoist and Blower.
2—**WHITING** #8 Cupolas
1—**B & P SPEEDMULLOR,** #60 with **SKIP**
1—**SIMPSON MULLER,** #3 with **SKIP**
2—**SIMPSON MULLERS,** #0, capacity 175 lb. batch, late type
1—**CLEARFIELD MIXER** #610
1—**CHAMPION CORE BLOWER,** CB 400
1—**TROPENAS STEEL CONVERTER,** 2 Ton Side Blow, Complete with Blower

3—**CLARK** fork lift **TRUCKS** 108" lift —2,000 and 3,000#

4—**AMERICAN SAND CUTTERS,** All sizes
1—**HEWITT-ROBINS** Apron Type Conveyor
2—**SIMPLICITY SHAKE-OUTS,** 4' x 8'
9—**CORE OVENS,** gas & electric, all types
NUMBER OF MAGNETIC SEPARATORS
1—**ROTOCLONE,** 16W, Arrangement D
1—**WHITING #8A KATHABAR,** Cupola Hot Blast
10—**GRINDERS,** double end, 5 to 20 HP
1—**HOWE** electric **WEIGHOGRAPH** Scale
2,000 FT. Foundry Type **ROLLER CONVEYOR**
1—**LINK BELT REVIVIFIER**
1—40 HP Sullivan **AIR COMPRESSOR**

B & P MOTIVE SAND SLINGER
19" HEAD

2—**HOUGH PAYLOADERS** 1,000 lb. cap.
9—**SAND BELT CONVEYORS** 2—**ELEVATORS**
CENTRIFUGAL BLOWERS, 1 to 85 HP
1—**DEWALT ABRASIVE CUT-OFF,** 10 HP
ROYERS & SCREENERATORS, All Sizes

FURNACES

1—60# **DETROIT** Arc Rocker
1—350# **DETROIT** Arc Rocker
4—Large **HEAT TREAT** Furnaces
ARC MELTING FURNACES, 60# to 15 tons
3—**AJAX-TAMA-WYATT** 333 KW for Alum.

1,000 LB. MOORE SIZE S
LECTROMELT—COMPLETE

5—**HAUSFELD TILTING,** various cap.
2—**FISHER TILTING,** 225 and 400# crucibles
5—**MONARCH** Barrel Type Tilting
1—**AJAX** 50 KW, 3000 cyc. induction
2—**AJAX** 35 KW high frequency melting
1—**FISHER** 1700# MNP Gas Fired—never used.

MOLDING MACHINES

1—**JOHNSTON & JENNINGS** 610 Rollover
2—**JOHNSTON & JENNINGS** #2 Jolt Squeeze Strippers
4—**OSBORN** #710 Jolt Strippers
1—**OSBORN** 444 Jolt Rollover
1—**DAVENPORT** 28A Rollover

12 SPO 110J JOLT SQUEEZERS

4—**HERMAN ROLLOVERS,** 60 x 80, 40 x 60, 144 x 96

Over 50 others: **MILWAUKEE, INTERNATIONAL, TABOR,** All types and sizes, rebuilt and guaranteed

COMPLETE STOCK OF TESTING MACHINES, LAB EQUIPMENT, CORE BLOWERS, LADLES AND OVER 250 TONS OF STEEL FLASKS

UNIVERSAL

MACHINERY AND EQUIPMENT CO.
320 E. BROAD ST.
SHILLINGTON, READING, PENNSYLVANIA
PHONE: READING 7-1321

For Sale

FOR SALE

MOLDING MACHINES

1—Herman, Jolt, Rollover Draw, 6000#, 40" x 60" table.
1—Herman, Jolt Stripper, 48" x 54" table.
2—International, Jolt, Rollover Draw, 24" x 10G, Stationary.
2—International, Jolt, Rollover Draw, 20" x 8-G, Portable.
1—Plain jolt machine, 60" x 72" table, 16" cylinder.
1—#276 PJ Osborn jolt squeezer.
2—No. 275 Osborn jolt squeezers.
2—SPO #611B Stationary Oscillating Jolt Squeeze Strippers.
1—#610 Johnston & Jennings Air Jolt Rollover Draw Portable 24 x 30 table.
1—Tabor 36 x 50 table Air Jolt Rollover Draw, 3000# capacity.

BLOWERS FOR CUPOLAS AND FURNACES

2—15 HP Spencer-Turbine 2250 CFM at 16 oz.
2—#7½ Roots rotary blowers—27 x 81—14000 CFM.
1—Connersville rotary blower 22 x 66 45 cu. ft. per revolution 9000 CFM.
Maxon-Premix Blowers for Gas ¼ to 1 HP.
2—5 HP 20-oz. Spencer Turbine Blowers.
2—2 HP 20-oz. Spencer Turbine Blowers.

METAL MELTING EQUIPMENT

1—1000# open flame brass melting furnace, gas fired.
1—MNP Fisher Tilting Al. Furnace 600# cap. gas fired.
1—550# Reda Furnace, nonferrous or iron—oil or gas.
1—Hausfeld Stationary Brass, oil or gas burner, 200# cap.
1—Hausfeld Tilting crucible, gas, 250# Al. Cap.
1—Hausfeld 2000# aluminum capacity furnace, barrel type, open flame, oil fired.
New 32" to 41" dia. shell cupolas made to order.
New 1000 lb. aluminum cap. tilting crucible furnaces to specifications.

MISCELLANEOUS

1—Pangborn Rotoblast, 14' dia. table with five 5' tables complete.
1—Pangborn 1 to 4 nozzle air blast generator, complete.
1—American Dust Tube Collector, 30 HP blower, 12000 CFM.
1—Sullivan, 2 stage compressor, 14-8¾ x 10, 75 HP.
500 ft. of 10" Roller Conveyor. Rolls 2½", centers 4".
1—Ruemelin cabinet style sand blast room, 7' x 7' x 5' with pres. generator.
1—15 HP Gardner Denver air cooled compressor unit.
1—Stoney crane type shakeout.
1—NC-4 Royer sand separator.
1—#1 Demmler core blower.
1—#16 Roto-clone unit complete.
1—McLeod Small Sand Blast Barrel 24 x 24.
1—30 x 48 tumbling mill.
1—36 x 48 tumbling mill.
Complete stock of rebuilt mill and dust exhaust blowers.

CLIFTON MACHINERY COMPANY

1023 W. SIXTH ST. CINCINNATI 3, OHIO

FOR SALE

Marschke Swing Frame Grinder
15 HP; Never Used—$750.00—Save $1,000.00
Dielectric Core Ovens—Model 900A and Model 1800A; Conveyor Type—1949
Osborn Core Blowers—Models 91, 94 and 193
Herman Jar Rollover & Pattern Draw; 1944; 48" x 144"; 10,000# Series
Int'l. JDP Pattern Draw; 600 lb. 8" draw
Int'l. LP6 Jolt Squeeze Pin Lifts
#2047 Osborn Jolt Rollovers
#918 Johnston & Jennings Molding Machine
#601, #602, #605 Osborn Jolt Rollovers
#275J Osborn Jolt Squeezers
8' Pangborn Tableblast
48" x 48" American Wheelabrator-Tumblast
36" x 42" Wheelabrator

FOR THE BEST DEAL CALL

BALCHER MACHINERY COMPANY
6020 EUCLID AVENUE
CLEVELAND 3, OHIO
TELEPHONE: EXPRESS 1-8930

For Sale

ATTENTION:

PNEUMATIC TOOL USERS

200 never used tools and many hundreds of rebuilt Chippers, Rammers, Riveters, Grinders, etc. at substantial savings.

Very large stock of spare parts, Standard and O/S.

Complete repair service on your tools by refitting parts or rebuilt to original sizes with HARD CHROME.

30 years' experience handling all makes and models.

Send us your next tools as a trial. Satisfaction guaranteed or money refunded. Estimates furnished.

THE PNEUMATIC TOOL PRODUCTS CO.
1340 EAST 222nd ST.
EUCLID 17, OHIO
PHONE: KE 1-4990

BUY—TRADE—SELL

SPECIAL

48 x 42 WHEELABRATOR TUMBLAST	$2,500.00
SMALL DOWN PAYMENT 2 YEARS TO PAY	
36 x 42 Wheelabrator	$2,500.00
#2 Wheelabrator Multi Table 8' Diameter	$3,500.00
Pangborn 6' Air Table	$ 650.00
8' Pangborn Roto-Table	$2,500.00
Pangborn 1 cubic ft Air Barrel	$ 350.00
Pangborn Vapor Blast, Good condition.	$ 750.00

Also

Roto-Clone Dust collectors various sizes, Pressure tanks, Hand cabinets, Blowers, Motors, etc. All types & sizes.
If interested in trading any of the above for your present equipment, Please call or write

DIAMOND SAND BLAST, INC.
5654 WEST JEFFERSON
DETROIT, MICHIGAN
PHONE VINEWOOD 3-6750

FOR SALE

1—Tinius Olsen 100,000# Universal Compression Testing Machine
1—Magnaflux Demagnetizing Unit
Simpson Sand Mixers 18" dia. Laboratory #0, #1, #1½, #2, #3
Miscellaneous: Screens, Pulverizers, Grinders, Conveyors—all types, Tyler Rotap Screens, etc.

OUR 37TH YEAR
CONSOLIDATED PRODUCTS CO., INC.
66 BLOOMFIELD STREET
HOBOKEN, NEW JERSEY
HO 3-4425 N.Y. TEL. BA 7-0600

FOR SALE
DETROIT ELECTRIC FURNACE

Type AA of 1,200 lb. cold metal or 2,600 lb. hot metal capacity, complete with mechanical and electrical equipment for melting and rocking, including oil filled transformer of 11,000 v. primary and 125 v. secondary. Presently crated but available for inspection on 48 hours notice. Ideal for high test cast irons, brasses or bronzes. Price: $9,500.00. Address: HOPE ELECTRICAL PRODUCTS CO., 338 WILSON AVENUE, NEWARK 5, N. J.

SAVE MONEY ON YOUR
PNEUMATIC TOOLS

High quality repair and rebuilding service—fast and economical. Send us your next pneumatic tool as a trial. Your money refunded if not satisfied, estimates furnished.

"WE WELCOME RUSH JOBS"

CENTRAL PNEUMATIC SERVICE CO.
512 LINDEN AVE.
DAYTON 3, OHIO
PHONE: MADISON 2701

FOR SALE

Aget-Detroit Model 11N50 Dust Collector. 1½ Horsepower motor, 1453 C.F.M. New condition $175.00. Address: PETER HEALEY BRASS FOUNDRY CO., P.O. BOX 834, EVANSVILLE, INDIANA.

FOR SALE

CONVEYORS:

Power Mold Conveyor
Pigmold Conveyor
Roller Conveyor.

CORE BLOWERS:

Champion
Demmler
International
Osborn

TUMBLING BARREL:

Sly Model 00 tilting type 48" x 42" with shot return.

CORE OVENS:

2-door Coleman
2-door Despatch

FURNACES:

2—#200/225 Stroman tilt
1—#14 Stroman Non-tilt
1—#40 Hausfeld Non-Tilt
2—# 2000 Hausfeld tilt

HEAT-TREAT

1—48" x 60" Lindberg elec.
1—30" x 42" G.E. elec.

ELECTRIC

1—Lectromelt 3 Ton cap.
Furnace Blowers & Cupola Blowers.

GRINDERS:

Double end and horizontal.

MOLDING MACHINES:

Jolt Rollover & Pattern Draw Molding Machines.
Jolt Squeeze Pin Lift Molding Machines.
Jolt Squeeze Molding Machines, Stationary & Portable.
Jolt, Pin Lift Molding Machines.
Rockover & Pattern Draw Molding Machines.
Plain Jolt Molding Machines.
Champion Pushoff Molding Machines.

SANDSLINGERS:

B-P Stationary 16" head
B-P Motive Junior 19" head

SHAKEOUTS:

Robbins 4' x 6' & 4' x 10'
Simplicity 4' x 6'

SAND MULLERS:

1—#2 Simpson
6—#3 Simpson
2—#70 B-P
1—#40 B-P
1—#2 Blystone

SAND BLAST & SHOT EQUIPMENT:

1—9' Rotoblast table—Mott Type SG Automatic
1—8' Pangborn Rotoblast table Type LG-9-431
1—6' Pangborn Rotoblast table Type LG
1—#12-GK14 Pangborn Rotoblast Barrel
2—Pangborn Sandblast Cabinets EP-5-431
1—Sandblast Room—Walkin type

AIR COMPRESSORS:

1—425 H.P. Chicago-Pneumatic diesel driven 20" x 12" x 14", with receiving tank
1—150 H.P. Ingersoll-Rand 875CFM, 220/3/60 with receiving tank
1—40 H.P. Pennsylvania 220/440/3/60 with receiving tank

We buy and sell complete foundries.

EUCLID FOUNDRY & MACHINE EQUIPMENT COMPANY

14919 SARANAC ROAD **TELEPHONE: GLENVILLE 1-1222** **CLEVELAND 10, OHIO**

FOR SALE

NEVER USED: for Detroit Electric Furnace Model LFY
1—Kuhlman transformer, 250 KVA, 4160 volt
2—cylindrical shells, Model LFY
1—complete lining for LFY shell
also
1—1000 Modern covered ladle

EASTERN FOUNDRY SUPPLIES, INC.
190 FRELINGHUYSEN AVE.
NEWARK, N. J.

FOR SALE

30—Osborn Manufacturing Company Jolt Rollover Pattern Draw Machines, size 21¼ x 22¼, maximum 11½, minimum 10", pattern draw 8".

ATTRACTIVELY PRICED

KARL NUSSBAUM AND SONS, INC.
29th & GARLAND AVENUE
LOUISVILLE 11, KENTUCKY
SPRING 4-5741 (ask for Walter Nussbaum)

SHAKEOUT SCREEN

1—Simplicity Engineering Company 2 x 3 Model C Portable Screen Aerating Unit complete with motor starter, and cable. This equipment was used only two months and is in perfectly new condition. Price $550.00. Address: MALLEABLE IRON FITTINGS CO., BRANFORD, CONNECTICUT.

FOR SALE

Bargain for small iron foundry. Bench-floor flasks, with jackets, mold weights, core plates, vibrators, molders tools, conveyor, etc. Address: Box 304, FOUNDRY, Cleveland 13, Ohio.

FOR SALE

Other interests forces us to sell our foundry sand business. Pits and equipment near Massillon, Ohio.

Will sacrifice for $11,000.00.

BOX 308

FOUNDRY **CLEVELAND 13, OHIO**

CARBON & GRAPHITE
Blocks—Plates—Rounds
MOTOR AND GENERATOR BRUSHES

of all types. Original equpment and replacement. Quick delivery from stock. Substantial savings.

BECKER BROS. CARBON CO.
BASIC MANUFACTURERS SINCE 1890.
3448 S. LARAMIE CICERO 50, ILLINOIS
BIshop 2-1260

FOR SALE

Discontinuing foundry. Will sell all equipment consisting of jarrers, squeezers, testing equipment, strippers, roll-over, sand Royers, flasks, benches, electric furnace, sifters, core machines, turntables, bumpers, etc. Write for complete list. Will sell all or individual items at approximately 10% of today's price.

BERGEN MACHINE & TOOL CO., INC.
189 FRANKLIN AVENUE
NUTLEY 10, NEW JERSEY

MONORAIL CUPOLA CHARGER

Constant service, 2-ton capacity, cage-controlled, single drum monorail cupola charger for sale. Specifications include 30 foot lift, electrical for 230V-DC, 90 feet per minute hoist speed, 200 feet per minute trolley speed. Three buckets plus rectilinear monorail switch included. Eight years of light service, immediately available. This cupola charger is in excellent condition, and is being sold at 50% BELOW current market price!

OVERHEAD CRANE DIVISION
HARNISCHFEGER CORPORATION
4400 W. NATIONAL AVE.
MILWAUKEE 46, WISCONSIN

FOR SALE

1—#14 Pangborn Type GK Rotoblast Barrel drum 36" x 49" long, (14 cu. ft. capacity) designed to handle individual pieces up to 150 lbs. and load of 2500 lbs. Barrel complete with all electrical and other equipment. Reason for selling—installing a much larger unit. Can be inspected at site.

TREADWELL ENGINEERING CO.
EASTON, PA.

SMALL GRAY IRON CASTINGS FOR SALE

Castings up to 300 lbs. Write or Phone: OREGON CASTINGS COMPANY, LITITZ, PENNSYLVANIA, PHONE: 6-2462.

FOR SALE

MOLDING MACHINES

10—**S P O** No. 110J Portable Squeeze
1—**S P O** No. 506 Jolt Rollover Pattern Draw. 600 lbs. Cap., 10" Draw, 24" x 25" Table. Stationary and Portable Type.
2—**S P O** No. 507 Jolt Rollover Pattern Draw, 32" x 40" Table, 1500 lbs. Jolt Capacity Draw 10" to 20".
2—**OSBORN** No. 142 Jolt, Rollover, Foot Draw, 14½" x 24" Table Draw 8", 350 lbs. capacity.
4—**OSBORN** Model 601, Jolt Rollover, Pattern Draw Machines. 600 lbs. capacity. Flask 30". For core work.
6—**OSBORN** No. 275J, Jolt Squeeze Machines, portable and stationary.
3—**OSBORN** No. 559 HD Jolt Strippers, Stationary, Table 25" x 30", Jolt 1200 lbs.
6—**OSBORN** Jolt Squeeze Model #75J, 10" cylinder, 3½" Jolt, cy. Table 16" x 20".
2—**HERMAN** Pneumatic 40" x 60", 15" Solid Cylinder Jarring Molding Machine, Heavy Duty Bumper Type.
1—**HERMAN** 40" x 58", 3000 lbs. Rollover and Drawing machine, 18" cylinder. Serial No. 1837. 1945.
2—**JOHNSTON & JENNINGS** #815-B Jolt Rollover Pattern Draw, 30" x 40" table, 15" draw, 1200 lbs. capacity, late unit with air operated head.
1—**JOHNSTON & JENNINGS** #681-C Portable Jolt Stripper, 24" x 30" Table.
1—**JOHNSTON & JENNINGS** Model 1216S Stationary Jolt Pin Lift, table size 36" x 54", Draw 16". Capacity 3000 lbs.
1—**JOHNSTON & JENNINGS** Model 918-B Jolt Rollover Pattern Draw, 44" x 54" Table, 20" Draw, 3000 lbs. capacity.
3—**TABOR** Jolt Squeeze Machines, Portable.
2—**TABOR** Jolt Rollover and Pattern Draw, Draw 10", 600 lbs. capacity, 22" x 42" Table. Shockless Jar Type, Portable.
2—**TABOR** Jolt Rollover Pattern Draw, 30" x 40" Table, Draw 12" Capacity 1000#.
1—**INTERNATIONAL** Model PKL, Jolt Squeeze, Air Pin Lift Machines. 18" x 24" Table, Lift 5½", Squeeze cy. 12".
2—**INTERNATIONAL** Type RES, Size 15" x 8", Jolt Squeeze, Rollover, Draw Machines. Table size 18" x 34".
4—**INTERNATIONAL** Type G, Air Jolt, Air Turnover Foot Draw Machines, Sizes 20" x 8"—24" x 8"—30" x 8"—24" x 10".
2—**DAVENPORT** Model 28A Jolt Rollover, and Pattern Draw, 1500 lb Jolt Capacity. 12" Draw, 30" x 40" table. Used less than 1 year.
1—**MILWAUKEE** #1030 Jolt Pin Lift. Table size 28" x 34", 12" Draw, 1000 lbs. cap.

SAND PREPARATORS

8—**BEARDSLEY & PIPER** Models "S", "M" and "L" Screenerators. Pneumatic Tires.
1—**BEARDSLEY & PIPER** Nite Gang, Ser. No. SNG 1-491, excellent condition, used 1 year.
1—**BEARDSLEY & PIPER** Sand Preparator. Portable, Model 70, with magnetic separation, 90 cu. ft. hopper, aerator and gyrating screen, serial No. SC-73.
1—**ROYER** Model NC-4 Sand Conditioner, portable, 12 to 15 tons.
2—**ROYER** Model C-2 Sand Conditioners, portable, 25 to 30 tons per hour.
1—**JEFFREY** Type "P" Sand Conditioner, Class B Mixer, Portable.
1—**AMERICAN** Sand Cutter, Model AM, Size 69 x 45. Late model.

SHAKEOUTS

1—**SIMPLICITY** Shakeout, 4' x 6', Serial No. 46—SOB—145, Model B.
2—**SIMPLICITY** Shakeouts, 4' x 8', Serial No. 48—SODE 104, Model DE, 16,000 lbs capacity.
1—**ROYER** Shakeout and Sand Conditioning Unit. Serial No. ST-47.

CORE BLOWERS

3—**OSBORN** No. 91 and 92 Core Blowers with Air Clamps.
1—**DEMMLER,** No. 1-E Core Blower. Equipped with Air Clamps, 1950 Machine.
1—**DEMMLER** No. 2 Core Blower, Air Clamps.
2—**REDFORD** Core Blower No. 1, Cartridge Bench Type.

TRAMRAIL & MONORAIL

100'—**AMERICAN** Tramrail, complete with two Bridges 15' and 14', and two Crossovers.
125'—**LOUDEN** Monorail, complete with four 20' Bridges and all accessories.

AIR & ELECTRIC HOISTS

1—**INGERSOLL RAND,** Size D, 4000 lbs. Late type Air Hoist.
1—**LITTLE GIANT,** Model A, 1000 lbs. capacity.
1—**ELECTRO-LIFT,** 3000 lbs capacity, low head room, Hoist, 220/440 Volts, Cable Type.
4—**AMERICAN** Engineering Electric Hoists Type A1, 220 volts, 3 phase, 60 cycle, 2000 lbs. capacity, for tramrail.
1—**SHAW-BOX** Electric Hoist, 3 ton Hoist, 220/440 volts.
1—**DETROIT Electric Hoist,** 5 ton capacity, 220/440/3/60 cycle. 1 year old.

SAND BLASTING EQUIPMENT

1—**AMERICAN WHEELABRATOR** Multi-Table Blast Machine, 8-27" Tables, with Shot Return and Dust Collector. Serial No. A-44791, Model BM 66900.
1—**AMERICAN WHEELABRATOR** Tumblast, 48" x 48" with Skip Hoist, shot return and dust collector, Serial No. 37,642.
1—**J. W. PAXSON** Upright Sand Blast Cabinet.
1—**PANGBORN** Tumblast Machine, Model GK 14, drum size 36" x 49", 14 cubic feet cap. complete with bucket loader and all electrical, 1943 unit.
1—**PANGBORN SHOT BLAST** Room 10' x 10' x 12', complete with pressure tank, hoses, nozzles and elevator.
2—**PANGBORN** Shot Blast Cabinets, Model EP-5, complete with shot return, pressure tank, and nozzles, etc. cabinet size 5' x 4' x 7'.

TUMBLING BARRELS

1—**NEW HAVEN** Air Blast Barrel 48" x 42". Equipped with Motor and Drive, 1942 unit.
1—**WHITING** Tumbling Barrels 30" x 60", plate 1", complete with 5 H.P. gear head motor drive, and starter, 1952 unit.
1—**SLY** Tumbling Barrel, 36" x 72", 10 H.P. Gear Head Motor, and Electrical.
7—**SLY** Tumbling Barrels, 36" x 60", 5 H.P. Gear Head Motor, and Electrical.
2—**SLY** Tumbling Barrels, 42" x 72", Square Type, 10 H.P. Gear Head Motor, and Electrical.
4—**SLY** Tumbling Barrels, 36" x 72", Flat Belt Drive.

B & P SANDSLINGERS

2—Tractor Type 6' arms, with 4' impeller head extensions, 4" wide liner and cups, 19" head, 15 HP motor or impeller, 10 HP motor for propulsion on tracks. Each machine equipped with additional impeller unit, 25 HP motor, 5" liner and cups. 220/440 volts.
1—Stationary Type Model DB, 16" head, 4" tip, 6" arm, 4' impeller head extension, motor two speed, dual 10-15 HP, 220/440. Complete with 4 ton plate feed hopper 10' x 7' chain drive and motors, etc. mounted on steel frames.
1—**B & P,** Model Tractor Type Sand Slinger with Magnetic Tower, 13' arm, 16" head, 4' ramming unit, 4" tip. 1951, like new.

GRINDING EQUIPMENT

2—**FOX** No. 5 High Speed Stand Grinders. Wheel size 24" x 3". 10 H.P. motor, 220/440 volts.
1—**HAMMOND** Model WR-1 Double End Snagging Grinder, 7½ H.P., 220/440/3/60.
2—**HAMMOND** Model WH-10 Donble End Grinders with (2) 7½ H.P. 220/440 3 phase, 60 cycle, wheel size 20" x 2" x 2".
1—**U. S. ELECTRIC** Double End Snag Grinder, Model 69, 10 H.P., 20" x 3" wheel size.
1—**U. S. ELECTRICAL** Swing Grinder, 24" x 3" wheel, 15 H.P., 220/440 volts.
1—**QUEEN CITY** Model 100 Double End Disc Grinder with 10 H.P. 220/440 Volt Motor, size 20" x 2" x 2".

CUT-OFF SAWS & MACHINES

1—**TABOR** Cut-off Saw, Serial No. 24626, 10 H.P. Motor.
3—**TESSEMER** Sprue Cutters, Model "H", cap. ¾" Brass. 3 H.P. Motor.

CORE OVENS

1—**COLEMAN** Core Oven, gas fired, 2 doors opening into single compartment, 37" wide, 78" high and 35" deep, adjustable trays.
2—**DESPATCH,** Gas Fired, Drawer Type Core Ovens, Drawers 46" wide, 59" deep, 9" high. Complete with Rail Supports and Controls. These machines are in excellent condition and were new in 1944.

DIELECTRIC CORE OVEN

Manufactured by Induction Heating Corp., Model #M-800A, 600 lbs. per hr. 8" max. hgt. of core, 24" wide, 220 volts, 15 KVA, 100 amps. Water cooled transformer, 60 cycle. 3 phase, belt 24" x 52" long. Machine had only 300 hrs. use. New in 1950.

CONVEYORS—Roller - Apron - Belt

300'—**MATHEWS** Roller Conveyor, Above Rail 20" wide, 2½" Rollers, on 4" centers.
1000'—**MATHEWS** Roller Conveyor, Above Rail 10" wide, 2½" Rollers. 4" Centers.
40'—Roller Conveyor 14" wide, 2" Rollers, above rail.
1—**FARQUHAR** 18" x 40', Model "343", Portable Trough Conveyor with 5 H.P. Motor and Starter, 3 Sided Feed Hopper.
1—**FARQUHAR** 18" x 19', Model "341", Undercar Unloader, equipped with Rubber Belt and 5 H.P. Motor.
1—**GODFREY** 18" x 19' Undercar Unloader, equipped with Steel Belt and 5 H.P. Motor.
1—Link Belt Steel Apron Conveyor, 18" x 24', with Motor and Drive.
1—Link Belt Steel Apron Conveyor, 24" x 20'.

SAND MULLERS

5—**SIMPSON** #3, enclosed gearing, style "C". Capacity 3000 lbs. 8' pan diameter, serial nos. in 58,000. 1946 units.
1—**SIMPSON** No. 2 Muller, unit drive type, complete with skip hoist loader 1500 lbs. batch size, late unit.
1—**SIMPSON** No. 0 Sand Muller, 175 lb. batch with motor and drive.
1—**SIMPSON** No. 2 Sand Muller. Open gear type motor drive.
1—**SIMPSON** No. 1 Sand Muller, single wheel unit, open gear, complete with motor. 5 HP motor and Jones Reducer.
1—**BEARDSLEY & PIPER** No. 60 Speed Muller, 10' Batch, complete with motor drive and all electrical, excellent condition.
2—**BEARDSLEY & PIPER** #3½ Mulbaros.
2—**CLEARFIELD** #404 Sand Muller, 4' pan diameter, late model units.

ELECTRIC FURNACES

4—**DETROIT** Electric Rocking Type Furnaces. Model AA, 1000 lbs. Cold charge, complete with single phase Transformers.

OIL & GAS FIRED FURNACES

5—**FISHER** #400 Crucible Type BBI, Hand Tilting, with Motors and Blowers, new bricking, gas or oil fired, 4 years old.
3—**FISHER** Model MNP Tilting Furnaces, 2000 lbs. capacity in Aluminum, 1500 lbs., for magnesium, complete with New Pot, blowers, and electrical tilting mechanism. Offered at Tremendous Savings.
1—**STROMAN** #600, Model "U" Tilting Reverberatory Furnace, 3 H.P. Motor and Blower, gas or oil fired; new 1949.
1—**YORK-WALKER** #28 Hand Tilt Furnace, 300-400 Crucible. New Bricking, Motor and Blower. Coke Fired.
4—Holding Furnaces, 500 lbs. capacity, Aluminum, Newly Bricked with Motor and Blower.
3—**STANDARD** Engineering Stationary Melting Furnaces, #30 #80 and #150 Crucible size, complete with gas fired burners, motor and blowers etc.

CUPOLA & FURNACE BLOWERS

Manufactured by G.E. centrifugal blower, type FS 3670-9400, serial No. 27006, motor 100 HP, 3600 RPM, Model 11A585.
1—**BUFFALO FORGE** No. 7-E Blower, 25 H.P., 3600 rpm, 220/440 volts. 28" wheel, 32 oz., 1600 cfm.
5—Assorted Blowers for Furnaces, 2-3-5 H.P., 16 oz.
1—**NORTH AMERICAN** Turbine Blower, 24 oz., 1900 cfm, with 20 H.P. Motor.
2—**NORTH AMERICAN,** 7½ H.P., 1900 CFM, 8 oz.
1—**STURTEVANT** #9 Cupola Blower, 75 H.P., 220/440 V., 3 Pr., 60 Cycle.

LADLES & POURING DEVICES

6—Modern Pouring Device, Models "F", "FA", "F-9", "FA-9". Ladle Hoists, with 17" Taper Covered Ladles, 500 lbs. capacity with Hand Tilting Devices.
12—**WHITING** Pouring Devices, Models 1000 & 2000, with 500 lbs. capacity. Ladles, complete with Trolleys and Hand Tilting Devices.
1—**WHITING** Ladle, 2000 lbs. capacity, enclosed gearing. Nose tilt.
1—**WHITING** Ladle, 4000 lbs. capacity, enclosed gearing. Nose tilt.
2—**WHITING** Ladles 1000 lbs. capacity, enclosed gearing, nose tilt.
1—**WHITING** Ladle 6000 lbs. capacity, enclosed gearing, nose tilt, NEVER USED.

MISCELLANEOUS

Cupola Charging Buckets, 36", Dieter Sand Test Equipment, Hoskins' Pyrometers, aluminum and steel flasks, **NEVER USED** crucibles, tongs, gloves, etc. and hundreds of other **NEVER USED** Items, but too numerous to mention. **SEND FOR LISTING.**

AAA MACHINERY & EQUIPMENT CO.

15539 SARANAC ROAD — *Members of American Foundrymen's Society* — **CLEVELAND 10, OHIO**

Electric Melting Furnaces

LECTROMELT 1 Ton, Side Charge. 800 KW transformer 12000 Volt primary. Late type unit. In place Chicago, complete.

LECTROMELT 500# Type T Side Charge. 300-375 KVA Transformer GE Circuit breaker. Moore controls 2300 volt primary current. Late type, now in our warehouse Chicago.

DETROIT ELECTRIC, 1500# capacity, 13,200 primary voltage. Kuhlman transformers. Complete with controls.

2-BAILEY (Electric Furnace Co.) 75 KW Electric Arc Type side electrode tilting furnaces and transformers.

DETROIT ELECTRIC 350#, Type LFA with Kuhlman transformers and oil circuit breaker. 13,200 primary voltage.

DETROIT ELECTRIC with 350# and 1000# tapered shells, 2300V Kuhlman Transformer. Complete with panelboard and bus bars.

1—9′ dia. shell Swindell type electric furnace, complete.

1—2500 KVA Westinghouse Furnace transformer, 13,800 V Primary.

1—2500 KVA Westinghouse Furnace transformer, 11,000 V Primary.

ACME EQUIPMENT CO., INC., 126 South Clinton Street, Chicago 6, Illinois, Phone: Andover 3-3430.

FOR SALE

AIR COMPRESSORS

Ingersoll Rand Type 10—14 x 9 x 12, 2 stage, 75 HP, 3/60/220/1200 rpm synchronous motor, 350 CFM at 100#.
5 x 5 Ingersoll Rand 10 HP motor.

BLOWERS

Spencer Turbo Blower, 2250 CFM at 16 oz. 15 HP 3/60/220 totally enclosed motor. New 1947.
Ingersoll Rand Motor Blower Type FS. Single Stage 4000 CFM @ 3.75 PSI, 100 HP, 220 V. G.E. Induction Motor.
Buffalo 7E Direct Connected Blower, 50 HP Westinghouse motor, 3/60/220-440 V, 3535 rpm, 28" wheel, 3500-4000 CFM at 32 oz. Flanged onutlet.
Spencer Turbo Blower. New 1949. 3500 cfm, 28 oz. with 40 HP 220-440 motor and Foxboro controls.

CONVERTER

100 KW Rotary Westinghouse 220 V 60 cycle primary 250 V DC, complete with controller and panel.

CORE OVENS

3—Section Foundry Equipment Co. Gas fired, 5 drawers per section.
4—Section Foundry Equipment Co. Gas fired, 5 drawers per section.

CRANES

5 Ton P & H Overhead Elec. Traveling Crane, 30′6" span, 15′ lift (can be increased) 3 motor, 220 V A.C. New 1946.
10 Ton Northern Overhead Elec. Traveling Crane, double girder, fish belly, 3 motors, 230 V D.C., 54′7½" wide C to C of wheels can be cut down to fit smaller size.

CRUSHERS—PULVERIZERS

1—Stedman 15" x 12" Type A. One with 10 HP 220-440 V motor.

GRINDERS, DISC

Besley 208 Double End 26" x 2⅜" wheel with 2 compound tables, V belt drive, 15 HP, 220-440 totally enclosed motor, magnetic starter controls.
2—U. S. Model 80 Double End 2-18" dia. wheels, 7½ HP motor, 2 swinging tables 8" x 14"—1 with hand lever feed.

GRINDERS, SNAGGING

McCabe 2" x 24" wheels, 48" between wheels, 3/60/440 V.
1—Hammond type 20 WR2—3" x 24" wheel, double end grinder, single speed, 20 HP Louis Allis Squirrel Cage, 220-440 V—1760 rpm motor.
1—U. S. DE, Model 65, 3" x 24" wheels, variable speed, 20 HP motor.

GRINDERS, SWING

2—Fox 10 HP 3/60/220-440 V, Swing Frame.
U. S. 15 HP, 3/60/440 V Swing Frame, 2 speed.
Fox 15 HP Swing Frame, 2 speed.
Marschke 20 HP, 2 speed.

SAND SYSTEM

By the piece or as a unit. Must be sold by September 15. No reasonable offer refused.

Beardsley & Piper #80 Speed Muller with 125 HP Fairbanks Morse 3/60/220-440V motor, air operated discharge, Clarage 15 HP Cooling Fan, mixing hopper.
14′—30" under muller conveyor motor and drive.
24" x 43′ Trough belt conveyor.
24" x 30′ Trough belt conveyor magnetic pulley.
48" x 18" x 45′ bucket elevator.
4 Round sand storage bins with 2-30′ bucket elevators arranged for storage of new or used sand.
4 Syntron vibrating feeders 30" x 84", type FC4 with controllers.
2—5′ x 5′ x 5′ sand hoppers for wheelbarrow delivery.
1 Flat belt conveyor 20" x 160′.
4 x 6 Simplicity DE, 15,000# Shakeout.

HOISTS

500# American LoHed.
1000# Cleveland 220/440 V.
1000# Detroit 220/440 V.
5—1000# P & H Hevi Duty with trolley.
2—2000# P & H Hevi Duty with trolley.
2000# Detroit Electric.
11—4000# P & H Hevi Duty with trolley.
2—4000# P & H Hevi Duty with trolley and powered drive unit for moving hot metal.

LADLES

1 Ton Enclosed Gear Crane Ladle truck type 4 wheel car for 18" gage track, Whiting Junior.
1—20½" Top Whiting Enclosed Gear Ladle.
3—1500# Modern Cylindrical covered

MOLDING MACHINES

2—Champion Pin Pushoffs, 38" x 40"—12" draw.
1—Johnson & Jennings 1015 Jolt Pin Lift, 30" x 38" table.
1—Champion Hand ram, hand clamp, hand rollovers 26" x 14" table.
1—Champion Hand Ram, Hand rollover, Hand draw core machines, 15 x 15 bed.
3—Davenport Portable Jolt Rollover Pattern Draw 20" x 24" tables, open end, 8" draw.
1—International Type G 24 x 10 Jolt Rollover, foot draw, 22 x 30 table, 10" draw.
1—Herman Molding Machine Jolt Rollover Pattern Draw, 20 x 30.
1—Herman Molding Machine Jolt Rollover Pattern Draw, 20 x 36.
1—International Type G 30 x 12 Jolt Rollover Foot Draw, 28" x 36" table, 12" draw.
1—International Type G 30" x 30" table, 9" draw, Portable.
2—International Type G 18" x 56" table, 8" draw. Portable.
1—International Type F Jolt Rollover 27 x 12, 12" draw, 35" x 26" table.
1—International Jolt Rollover Pattern 10" Draw, 22" x 30" plate, 6" jolt cylinder.
1—International Plain Jolt Molding Machine 48" x 60" table, no pit required.
1—Herman Jolt Rollover Pattern draw, 40" x 84" table, slotted nickel alloy table over regular table to accommodate various sized flasks, air clamp, new 1946. Used very little.
1—Herman 20" x 30" rollover pattern draw, 750# series. Air clamp.
2—Herman 20" x 24" Jolt Rollover Pattern Draw, 750# series. Air clamp.
1—Herman 4000# Series High Speed Rollover 30" x 60" with 32" x 48" bumper, 13" cylinder pattern device.
2—Milwaukee Arm Type Jolt Squeeze Strippers, 1500# capacity, Model 163-50 Serial 13104-5, 15" x 24" table, 16" x open end, pattern size. Late type.
1—Osborn 76J Portable Jolt Squeeze Molding Machine 12" cylinder.
3—Osborn Jolt Squeeze Molding Machines, 275J, 16 x 20 table, tilt back head.
2—Osborn 405 Jolt Rollover 40" x 70", 2000# capacity, 20" x 60" jolt table and 4 wheel receiving car.
1—Tabor 1000# Rollover, 30" x 60" table.

MULLERS AND MIXERS

Simpson #2 Motor on base, bucket loader.
Simpson #3 Motor on base, bucket loader.
Simpson #3 Type H open gear type.
Simpson #3 Open Gear Type, $1000.00.
American Model M Sand Cutter, 70" blades.
Royer NDP 47 14" Belt, 4 rubber tires.

PREPARATOR

B & P #70 Preparator. Only used 3 months.

ROTOBLAST

Pangborn, table with 3-8" rotating work tables, 3 position loading, cleaning and touch-up designed for work similar in size to aircraft cylinders. Like New condition.

SHAKEOUTS

2—4′ x 6′ Simplicity.

SPEED REDUCERS

We have a large stock of speed reducers and geared head motors. Write us your needs.

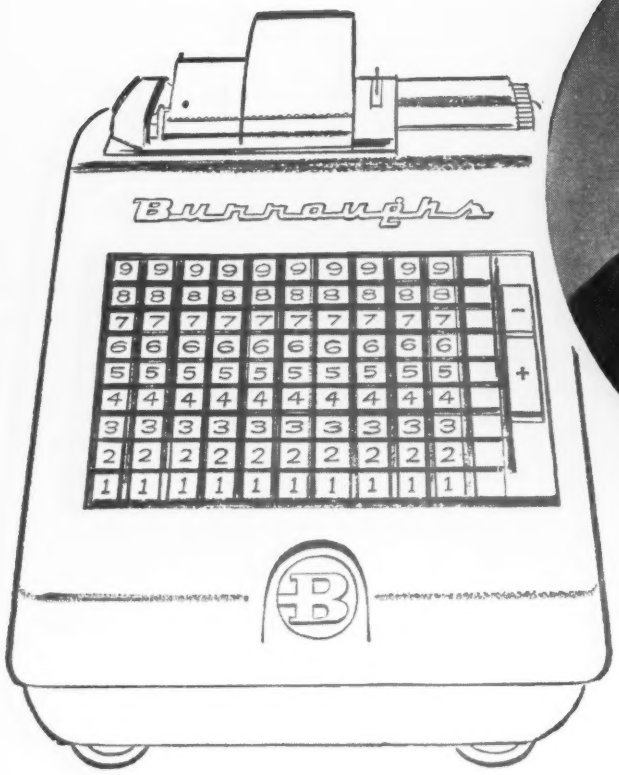
WIRE STRAIGHTENERS

2—Climax 1 HP motor.

ACME EQUIPMENT CO., INC.

WE WILL BUY FOR CASH A SINGLE PIECE OF EQUIPMENT OR YOUR ENTIRE FOUNDRY

126 South Clinton Street Phone: Andover 3-3430 Chicago 6, Illinois



J. S. Coleman, President
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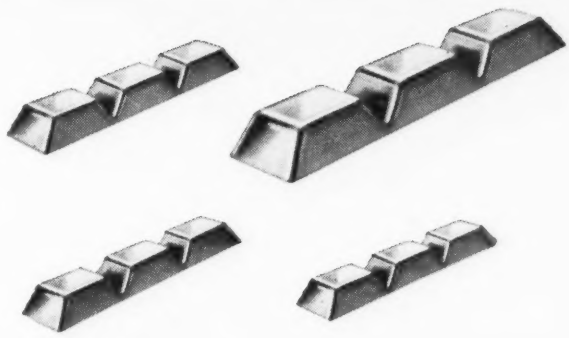
...FACTS YOU NEED TO KNOW ABOUT ALUMINUM INGOT FROM SMELTERS



Aluminum Smelters' products are designed for Foundries

The alloys produced for you are the major items of aluminum smelters—80% of their business is *your business*. Therefore, casting alloys are the *main endeavor*—not a sideline to be pursued "when, as, and if".

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no foundry ever shut down because ingot was not available from smelters!

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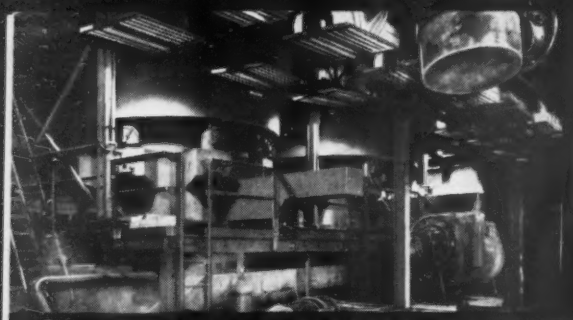
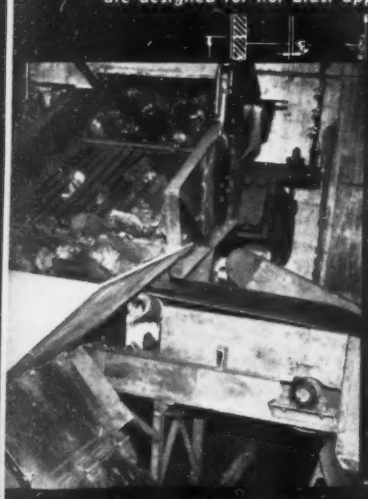
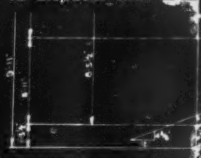
MODERNIZE



Four, MODERN cupolas with front slagging system and stock-line indicator. Cupolas are designed for hot blast application.

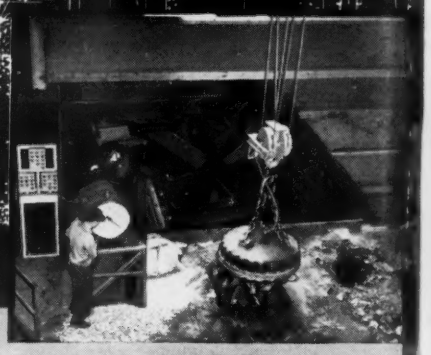


Vibratory feeder with grizzly section eliminates breeze and fines. Fines are belt conveyed to disposal bin.

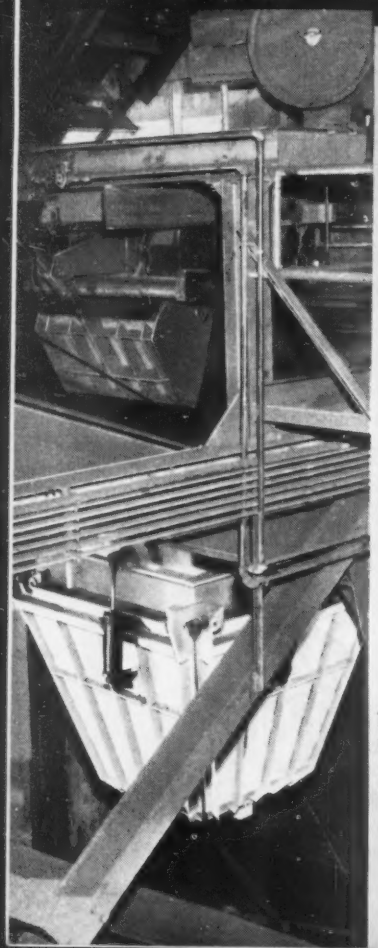


Coke and stone weigh-hopper, mounted into the scale, charges the MODERN small-cone bucket.

Elevation drawing to indicate the location of equipment inside the foundry and relation of charger to the yard crane.



Iron is charged by MODERN magnet crane.



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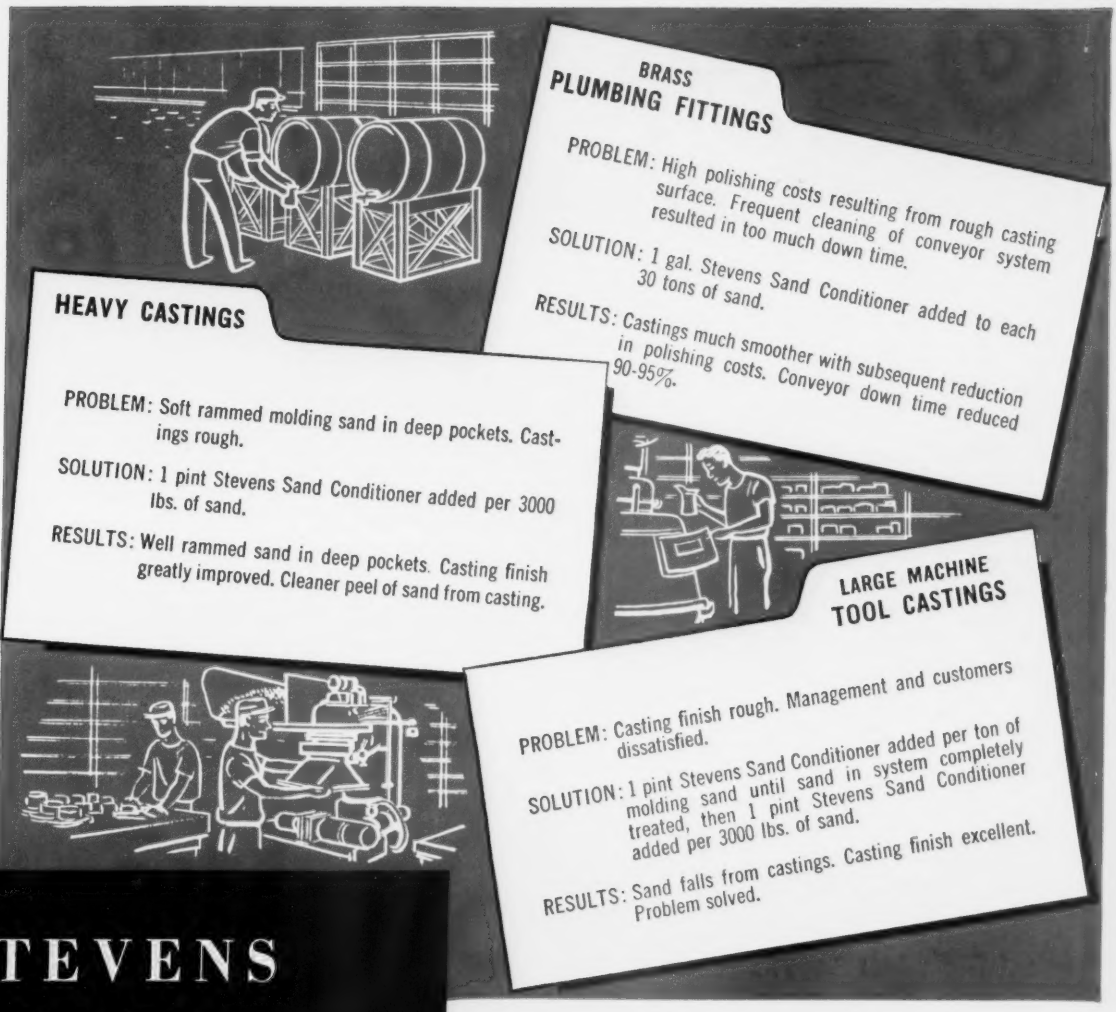
BRASS
PLUMBING FITTINGS
PROBLEM: High polishing costs resulting from rough casting surface. Frequent cleaning of conveyor system resulted in too much down time.
SOLUTION: 1 gal. Stevens Sand Conditioner added to each 30 tons of sand.
RESULTS: Castings much smoother with subsequent reduction in polishing costs. Conveyor down time reduced 90-95%.
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TOOL CASTINGS
PROBLEM: Casting finish rough. Management and customers dissatisfied.
SOLUTION: 1 pint Stevens Sand Conditioner added per ton of molding sand until sand in system completely treated, then 1 pint Stevens Sand Conditioner added per 3000 lbs. of sand.
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solves both mold and core production problems

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